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VOL. VII PART I

THE INDIAN FOREST RECORDS

Preliminary Note on the Seasoning of some Indian Timbers, by Natural Methods

by

R. S. PEARSON, I.F.S., F.L.S.,

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PREFACE

OWING to the nature of the enquiry, which involved carrying out seasoning tests with a variety of species, distributed all over India and Burma, it was not possible to restrict the experiment to one locality, while the duration of the experiment was fixed at three years. Under the circumstances it was found impossible to do more than exercise central control from the Forest Research Institute, to carry out the final inspection at the more important centres and to enlist the help of the Divisional Forest Officers in respect of all other work. It would have been quite impossible to carry out this detailed experiment had not the officers concerned taken a real personal interest in the work, and most loyally co-operated during all phases of its operation.

The writer's best thanks are due to Sir H. A. Farrington, Bart. and to Messrs. J. L. Baker, J. Homfray, H. S. Gibson, B.A., and J. R. P. Gent of Bengal; to Messrs. T. R. Bell, J. Dodgson, A. G. Edie, G. E. Marjoribanks, A. C. Hiley and N. E. Shrigley of Bombay; to Messrs. P. H. Clutterbuck, V.D., C.I.E., F. F. R. Channer, E. R. Stevens, R. St. G. Burke, J. N. Oliphant, B.A., J. V. Collier, B.A., S. H. Howard, B.A., M. W. Clifford, B.A., and G. O. Coombs of the United Provinces; to Messrs. R. McIntosh, M.A., A. D. Blascheck, F.C.H., R. N. Parker, F.C.H., H. L. Wright, B.A., E. A. Greswell, B.A., Munshi Imam-ud-din, Khan Bahadur (Retired,) and Pandit Gokal Das, Rai Bahadur (deceased), of the Punjab; Messrs. M. Hill, C.I.E., J. Carr of the Central Provinces; and to Messrs. H. H. Haines, F.C.H., R. Kirkpatrick, G. M. Cooper, A. P. Mudaliar and O. A. Dodsworth of Bihar and Orissa.

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Photo.-Mechl. Dept., Thomason College, Roorkee. Photo by R. S. Pearson.

Seasoning Experiment, Dandeli, North Division, Kanara, Bombay Presidency.

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I. Introduction.

A considerable amount of information is available as to the methods of seasoning a few of the better known timbers of India, such as Teak, Sal, Deodar, etc., though little information is to hand in respect of the many valuable hardwoods, other than the above. It was therefore thought advisable to start an enquiry in 1914, with a view of ascertaining the best methods of dealing with certain important Indian hardwoods, and as a commencement 33 species were selected for testing. The results obtained have been of sufficient importance to justify an immediate extension of the enquiry on a much larger scale.

That we have little or no information as to how to season many of our timbers would in itself be a sufficient reason for such an enquiry, and if further justification is needed it is only necessary to state that many useful timbers found in the forests of British India either only command a very small market or are unsaleable.

There is yet another factor of equal, if not greater, importance than the above, *viz.*, that the more scientific and intensive working of our forests, a subject which is now receiving much attention from all Forest Officers, demands not merely the removal of mature trees of a few of the best species but also heavy fellings of all species. Such operations can

only result in throwing enormous quantities of hardwood timbers on our hands to be marketed to the best advantage.

To introduce and create a market for such timbers, it is necessary to place them before the public in the best possible condition and this can only be done by proper conversion, followed by careful stacking and seasoning according to correct principles.

II. General Outline of the Enquiry.

The selection of species to be tested was based on proposals made by the Chief Conservators and Conservators of Forests of most of the Provinces and Circles in India and Burma. The scheme according to which the experiments were to be carried out was drawn up by the writer and his Assistant Mr. C. E. C. Cox, after having circularized all Forest Officers, Sawmill Managers and Timber Firms with a view to obtaining information as to the practical methods of seasoning at present in vogue.

From replies received it was apparent that no regular system for timber-seasoning was commonly pursued in India.

Appendix I is a copy of the original scheme, a *précis* of which is given below :—

(1) Seasoning of timber in the log, either (*a*) in the open or (*b*) in the shade, with either bark on or off, for varying periods, and subsequent conversion and seasoning of the sawn material, so as to bring the total seasoning period up to 36 months.

(2) Girdling trees, left standing for periods varying from 12 to 30 months, thereafter felling and conversion of the logs and further seasoning of the sawn material so as to bring the total seasoning period up to 36 months.

(3) Seasoning logs, immersed either in fresh water or in the mud of tidal creeks, followed by a further period of seasoning, after conversion, so as to bring the total seasoning period up to 36 months.

(4) Felling trees at different seasons of the year and subsequent seasoning in the log and after conversion in the form of planks.

(5) Conversion of green logs, the converted material being either placed in stacks to season under cover or immersed at once in water for a stated period previous to seasoning under cover.

(6) Seasoning timber in the log with bark on, and the ends of the logs treated with either Loracine, or Ligno, or Tar and cowdung, with subsequent conversion and seasoning for a total period of 36 months.

(7) Seasoning timber in the log with a saw-cut to the centre, with subsequent conversion and a further period of seasoning in the form of planks and scantlings.

(8) Study of the question of discolouration, cracking, warping, contraction, degree and rate of seasoning, insect attack and decay of timber treated under the above methods; and comparison of the relative degree of success attained under each method, with the corresponding results obtained by the method of treatment outlined in section (1) above.

The extended scope of the scheme together with the number of species to be tested necessitated sub-dividing the experiment into several sections and distributing the work amongst different Provinces. This system had the advantage of allowing the timber to be seasoned under varying climatic conditions.

The distribution was as follows:—

Province.	Division in which experiments were carried out.	Species tested.
Bengal.	Kurseong	*Albizzia procera.* *Anthocephalus Cadamba.* *Artocarpus Chaplasha.* *Cedrela Toona.* *Dillenia pentagyna.* *Duabanga sonneratioides.* *Lagerstrœmia parviflora.* *Michelia Champaca.* *Schima Wallichii.* *Terminalia belerica.*
	Chittagong.	*Artocarpus Chaplasha.* *Lagerstrœmia Flos-Reginæ.*
	Darjeeling.	*Machilus odoratissima.*
Bombay.	North Division, Kanara.	*Adina cordifolia.* *Bassia longifolia.* *Dalbergia latifolia.* *Grewia tiliæfolia.* *Lagerstrœmia microcarpa.* *Ougeinia dalbergioides.* *Pterocarpus Marsupium.* *Terminalia paniculata* *Xylia xylocarpa.*
	West Division, Kanara.	*Adina cordifolia.* *Lagerstrœmia microcarpa.* *Terminalia paniculata.* *Xylia xylocarpa.*

Province.	Division in which experiments were carried out.	Species tested.
United Provinces.	Lansdowne. Bahraich. Ramnagar and Siwaliks. Ramnagar. Haldwani. Jhansi. Kheri.	*Albizzia odoratissima.* *Bassia latifolia.* *Bombax malabaricum.* *Dalbergia Sissoo.* *Shorea robusta.* *Terminalia Arjuna.* ,, *tomentosa.*
Punjab.	Lahore.	*Morus indica.* *Dalbergia Sissoo*
	Rawalpindi and Kangra.	*Pinus longifolia.*
Central Provinces	South Chanda.	*Adina cordifolia.* *Diospyros Malanoxylon.* *Lagerstrœmia parviflora.* *Ougeinia dalbergioides.* *Pterocarpus Marsupium.* *Stephegyne parvifolia.* *Tectona grandis.* *Terminalia Arjuna.* ,, *tomentosa.*
Bihar and Orissa	Singhbhum. Sambalpur.	*Shorea robusta.* *Pterocarpus Marsupium.*

The scheme as originally laid down was adhered to with a few minor modifications, such as small extensions to the N. Kanara experiments, by which yet another method of seasoning was added, and slight alterations as to dates of felling and conversion to meet local conditions in the various Provinces.

III. Method adopted in checking Experiments and data on which results are based.

The results are based on tests carried out with 33 species comprising 1,004 logs, converted into 10,004 planks, scantlings and sleepers.

Appendix II illustrates the forms maintained to record the progress of each experiment, and Appendix III is the form in which results of interim and final inspections were recorded.

The method followed at the final inspection of each species of timber was to carefully inspect each individual plank or scantling, to record in the form given as Appendix III all defects, if any, and after having gone over all the timber pertaining to one batch, to pass a general note on its condition, and finally to record the relative value of each batch to the whole. Later, after the experiments were completed in every Province, computations were made of the percentage of timber recorded as sound, badly cracked, badly warped and insect-attacked, of each

species seasoned according to different methods, the information concerning which is given in Appendix IV. It was found that, without exception, the remarks passed in the general notes in the field as to the state of the timber were fully corroborated by the percentage figures worked out later at Dehra Dun, which clearly indicate that the method adopted for recording the experiments fully met the conditions of the case.

It was necessary to ascertain whether timber of any individual log cracked before or after the log was converted; to do so sketches of the ends of all logs were taken, directly after felling the tree and again before conversion: this, though a somewhat tedious process, met the case and was of the greatest value during the final inspection.

It was of great importance to ascertain the degree of seasoning at the time of the final inspection and, in some cases, during the progress of the experiment. In order to do so, samples of the timber were submitted to the Chemical Adviser for analysis. In this connection very definite factors were established as to the rate and degree of seasoning in different localities. By referring to Appendix IV it will be seen that the timber during December to January, in a fairly dry locality such as Allapilli, in the Central Provinces, after three years' seasoning, in a shed, contained somewhere about 16 per cent. of moisture; in the very dry zone of the Punjab, at Changa Manga, timber seasoned in the open, contained from 8 per cent. to 12 per cent. of moisture; while in the wet zone in Bengal, at Sukna in the Kurseong Divison, the average moisture was near 25 per cent. and, in some cases, as high as 44 per cent. and this after three years' seasoning.

IV. Results obtained.

(*i*) GENERAL REMARKS.

At the time the experiments were initiated some doubt existed as to whether sufficiently definite results would be obtained to justify conclusions being drawn as to the correct methods of seasoning the different species of timber. In the majority of cases, however, excellent results have been obtained: a glance at the records given in Appendix IV, against such species as *Bombax malabaricum, Duabanga sonneratioides, Dillenia pentagyna, Diospyros Melanoxylon, Lagerstrœmia Flos-Reginæ, Terminalia belerica* and many others will fully support this assertion. In the case of such timbers as *Dalbergia Sissoo* and *Dalbergia latifolia,* both timbers of excellent quality, which rarely split seriously while seasoning, the difference in results obtained by seasoning the timber in various ways is not so marked. In the case of *Bassia latifolia, Grewia*

tiliæfolia and *Xylia xylocarpa* (Indian) very satisfactory results were not obtained, when seasoning according to the methods adopted, though some methods gave distinctly better results than others, while in the case of *Anthocephalus Cadamba* the results were negative in every instance.

The results show that the number of species which should be either girdled, or the timber converted from green logs, with or without subsequent immersion in water, is about equal, and that about 94 per cent. of the total number of species tested must be treated either according to one or other of these two methods. Natural seasoning in the log, with or without bark on, in the shade or in the open, and with or without ends treated with a coating of any protective substance, has only given beneficial results with high quality timbers, such as *Dalbergia latifolia*, *Ougeinia dalbergioides*, the *Albizzia* spp., etc.

The experiments throughout indicate the great importance of careful stacking of timber, on level ground, with free circulation of air round each piece. Without wishing in any way to labour this point, it may be said that satisfactory results cannot be obtained without proper attention being paid to this work. It is also advisable to break the stacks and turn the timber, if left for more than 3 or 4 months in one place, this being especially necessary in damp climates. In some of the experiments, as for instance those carried out at Sukna in Kurseong and at Dandeli in the North Division, Kanara, the timber after conversion was stacked in the open, under the shade of trees, both places having a heavy rainfall. This resulted in the timber of certain species being heavily attacked by fungus and in all cases resulted in undesirable discolouration of the timber. At Allapilli in the South Chanda Division, the timber was stored in a suitable shed, with very beneficial results, which fully justified the extra cost. Though permanent seasoning sheds, entailing a somewhat heavy initial expenditure, are no doubt justified in certain cases, it is quite feasible to erect quite temporary shelters in other cases, the cost of which will be more than repaid by the higher prices realised for the timber.

(*ii*) RESULTS ACCORDING TO SPECIES.

(1) **Adina cordifolia** (Appendix IV-1).

(*a*) *Locality where tested.*—North and West Divisions, Kanara, Bombay; and South Chanda, Central Provinces.

(*b*) *Best methods of seasoning.*—Conversion from green logs and seasoning for 12 months under cover (Bombay), or girdling for 12 to 18 months followed by a further seasoning period of 6 months in the plank (Central Provinces).

(*c*) *Other methods of seasoning.*—The results of felling either in cold, or hot weather or in the rains gave very similar results. Attack by insects was heavy, especially when the logs were seasoned with bark on, while by removing the bark cracking was excessive. Treating the ends of logs with any composition did not materially retard cracking.

(*d*) *General remarks.*—This timber is more suitable for cutting up into planks, boards, and rafters than into beams.

NOTE.—Mr. Carr, D.F.O., South Chanda, made a subsequent inspection of the timber and noticed that all timber seasoned according to methods described under section (*c*) was further attacked by insects, whereas that seasoned according to methods advocated under section (*b*) showed no tendency to insect attack.

(2) **Albizzia odoratissima** (Appendix IV-2).

(*a*) *Locality where tested.*—Lansdowne Division, United Provinces.

(*b*) *Best method of seasoning.*—The best results were obtained by naturally seasoning the timber in the log, placed in the shade. It takes about 24 months in the log and 6 months in the plank to thoroughly season 2″ planks under cover.

(*c*) *Other methods of seasoning.*—First immersing the logs in water for 4 months, followed by 15 to 21 months seasoning on land and finally 8 to 13 months seasoning in the plank, gave results distinctly inferior to those obtained with natural seasoning on land, both in respect of splitting and colour of the timber.

(*d*) *General remarks.*—The timber is suitable for cutting into planks and rafters, and is a valuable ornamental wood.

(3) **Albizzia procera** (Appendix IV-3).

(*a*) *Locality where tested.*—Kurseong Division, Bengal.

(*b*) *Best method of seasoning.*—Conversion from green logs, followed by 12 months' seasoning in the plank under cover.

(*c*) *Other methods of seasoning.*—The timber throughout was good. Results little inferior to those resulting from green conversion were obtained by either girdling the trees or by seasoning the timber in the log, with the ends either tarred, or smeared with Loracine or cowdung and mud. The sap-wood is useless and perishes rapidly by fungus and white-ant attack.

(*d*) *General remarks.*—The grain and colour of this timber was good, even after 3 years' exposure in a damp climate. It cuts up well into boards and can be used for both internal and external work. This timber is not in great demand in Bengal, but fully deserves further consideration.

(4) **Anthocephalus Cadamba** (Appendix IV-4).

(*a*) *Locality where tested.*—Kurseong Division, Bengal.

(*b*) *Best method of seasoning.*—Not known, the timber resulting from all experiments was rotten, due to fungus attack. The timber, which was all seasoned in the open and exposed to three heavy monsoons, had chiefly deteriorated at the points of contact in the stacks. The timber which came from the bottom of the piles and which had therefore been partly protected, was found to be sound and hard, which indicates that were it to be seasoned under cover for about 12 months and the stacks broken occasionally, the timber would season without deteriorating. This supposition is partly corroborated by the fact that this timber is extensively used for tea-boxes, where it is not exposed to excessive moisture. From the nature of the timber it is not suitable for anything but internal match-boarding, light rafters, dry goods packing cases, and to a limited extent for joiner's work.

(5) **Artocarpus Chaplasha** (Appendix IV-5).

(*a*) *Locality where tested.*—Kurseong and Chittagong Divisions Bengal.

(*b*) *Best method of seasoning.*—The results obtained both in Kurseong and in Chittagong show that it is best to girdle the trees but that there is no advantage in allowing the trees to stand girdled for over 12 to 18 months. After felling and conversion, the planks and rafters should, if possible, be allowed to season for a further period of six months under cover.

(*c*) *Other methods of seasoning.*—Seasoning in the log either with bark off, or with bark on, and with the ends protected, as also green conversion, gave fair to good results though, in several cases, these methods of seasoning gave rise to fine surface and end cracks.

(*d*) *General remarks.*—The sap-wood of this timber perishes very rapidly and should be excluded when converting the logs into planks and rafters.

(6) **Bassia latifolia** (Appendix No. IV-6).

(*a*) *Locality where tested.*—Bahraich Division, United Provinces.

(*b*) *Best method of seasoning.*—The best results were obtained by converting green logs, followed by stacking in the shade for 12 to 18 months. Better results were obtained with one-inch than with two-inch planks, while in both there was a considerable amount of surface cracking ; the two-inch planks showed a strong tendency to warp.

(*c*) *Other methods of seasoning.*—Seasoning in the log gave poor results, but Mr. Clifford, who inspected this timber, is strongly of opinion that if the logs which were immersed in water had not been taken out during the hot weather, they would have given good results. It should be well worth while to carry out further tests in order to settle this point and also to immerse timber cut from green logs.

(*d*) *General remarks.*—The timber is strong and durable and, if properly seasoned, should find a ready market as planks and rafters for construction.

(7) **Bassia longifolia** (Appendix IV-7).

(*a*) *Locality where tested.*—North Division, Kanara, Bombay.

(*b*) *Best method of seasoning.*—The best results were obtained by converting green logs, but even this method of seasoning the timber was by no means ideal. It is quite likely that better results could be obtained by converting green logs, and at once immersing the timber in water for 4 to 6 weeks, followed by land seasoning, in a shed for 12 months.

(*c*) *Other methods of seasoning.*—Seasoning the log, with the ends treated with mud and cowdung, gave moderate results; all other methods gave poor results.

(*d*) *General remarks.*—The timber is strong and fairly durable. If well seasoned, it should find a ready market as timber for construction work.

(8) **Bombax malabaricum** (Appendix IV-8).

(*a*) *Locality where tested.*—Siwalik and Ramnagar Divisions, United Provinces.

(*b*) *Best method of seasoning.*—The only method by which really satisfactory results were obtained, was by converting green logs, and immersing the planks at once in water for 4 weeks, followed by seasoning on land for upwards to 18 months. Even better results might be obtained by immersion for 6 weeks followed by $4\frac{1}{2}$ months' seasoning in a shed. It is of great importance, when stacking this timber, to keep wedges between the planks in order to prevent discolouration; while if the timber has to be stored for long periods, the stack should be periodically broken.

(*c*) *Other methods of seasoning.*—All other methods of seasoning gave very bad results.

(*d*) *General remarks.*—The timber is suitable for boarding and packing cases. The timber which was seasoned according to the method described in section (*b*) was utilized 4 years after conversion for rosin packing cases, and was at the time in perfect condition.

(9) **Cedrela Toona** (Appendix IV-9).

(*a*) *Locality where tested.*—Kurseong Division, Bengal.

(*b*) *Best method of seasoning.*—The best results were obtained by girdling the trees, and conversion immediately after felling. Felling the trees after they had stood girdled for one year, gave slightly better results than by allowing them to stand for 18 months or two years. The sawn material should be carefully stacked under cover and seasoned for a further period of 6 to 12 months.

(*c*) *Other methods of seasoning.*—Slightly inferior results to those recorded above were obtained by seasoning the timber in the log, with bark on and with the ends smeared with either Loracine or Tar. The results obtained by seasoning the timber converted from green logs, as also by seasoning in the log with bark off were very unsatisfactory.

(*d*) *General remarks.*—This is an excellent timber for cutting into planks, and if properly seasoned will find a ready market.

(10) **Dalbergia latifolia** (Appendix IV-10).

(*a*) *Locality where tested.*—North Division, Kanara, Bombay.

(*b*) *Best method of seasoning.*—The best results have been obtained by seasoning the timber in rough hewn squares. The period of seasoning according to this method is from 18 to 24 months.

(*c*) *Other methods of seasoning.*—All methods of seasoning, other than green conversion, gave satisfactory results. When this timber is converted from green logs, and exposed to atmospheric influences it loses much of its colour, on which its value largely depends.

(*d*) *General remarks.*—This timber is often faulty in the centre so that when under conversion, it should be quartered so as to reject about 4″ of the core.

(11) **Dalbergia Sissoo** (Appendix IV-11).

(*a*) *Locality where tested.*—Ramnagar Division, United Provinces; and Lahore Division, Punjab.

(*b*) *Best method of seasoning.*—Girdling the trees for 18 months followed by conversion and seasoning for 12 to 18 months in the plank has given the best results. Probably 6 months in the plank after girdling would be sufficient, if in a dry locality.

(*c*) *Other methods of seasoning.*—Slightly inferior to girdling is immersion of the logs in water for 4 months, followed by land seasoning for a year and then conversion into planks and rafters. The worst results were obtained by seasoning the timber in the log, with bark off, which resulted in bad splitting.

(*d*) *General remarks.*—Mr. Parker, who carried out the final inspection at Changa Manga, Lahore Division, states that in order to obtain really good scantlings it is advisable to reject the centre of the log in conversion.

(12) **Dillenia pentagyna** (Appendix IV-12).

(*a*) *Locality where tested.*—Kurseong Division, Bengal.

(*b*) *Best method of seasoning.*—The only method which gave satisfactory results was girdling the trees and leaving them standing for 2 to 2½ years, followed by conversion and seasoning under shelter for 6 months.

(*c*) *Other methods of seasoning.*—All other methods of seasoning produced rotten timber, with the exception of a small percentage of timber from logs seasoned in water and then on land.

(*d*) *General remarks.*—This timber yields excellent rafters and boards for internal work, though it decays rapidly if exposed to excessive moisture. If quartered, it shows a handsome silver grain rendering it suitable for wainscoting and panelling.

(13) **Diospyros Melanoxylon** (Appendix IV-13).

(*a*) *Locality where tested.*—South Chanda Division, Central Provinces.

(*b*) *Best method of seasoning.*—The best results have been obtained by girdling the trees and allowing them to stand for two years before felling, followed by 6 months' seasoning in the plank or scantling. Trees allowed to stand for three years showed signs of insect attack.

(*c*) *Other methods of seasoning.*—Slightly inferior results to those recorded above, were obtained by conversion from green logs, followed by immediate immersion of the rafters and planks in water for 6 to 8 months, and subsequent seasoning on land for upwards to 18 months. Timber seasoned in the log, either with or without bark, split considerably, while the former was heavily attacked by Longicorn borers. Water seasoning in the log also gave poor results, both in respect to splitting and insect attack.

(*d*) *General remarks.*—This timber is not suitable for conversion into planks, though suitable for posts, rafters, shafts, etc. When converting the logs, the core should be either rejected or put aside for special purposes.

(14) **Duabanga sonneratioides** (Appendix IV-14).

(*a*) *Locality where tested.*—Kurseong Division, Bengal.

(*b*) *Best method of seasoning.*—The best results were obtained by girdling the trees, and allowing them to stand for a year to a year and

a half. Trees which stood for 33 months were found to be attacked by borers. The timber deteriorates if exposed to excessive moisture and should therefore be seasoned off, in a shed for 6 to 12 months after the girdling period.

(*c*) *Other methods of seasoning.*—Planks converted from green logs do not deteriorate so fast as those cut from logs seasoned in the round, which, moreover, tend to split excessively.

(*d*) *General remarks.*—This timber is valuable for boarding, presents a good appearance and is durable under cover.

(15) **Grewia tiliæfolia** (Appendix IV-15).

(*a*) *Locality where tested.*—North Division, Kanara, Bombay.

(*b*) *Best method of seasoning.*—The best results were obtained by converting green logs. The timber was seasoned in the plank for 3 years, which proved to be an unnecessarily long period and resulted in the timber going back, 18 months being sufficient to ensure proper seasoning. It is probable that still better results could be obtained by immersing the timber in water for 4 to 6 weeks immediately after converting the green logs and then seasoning off on land for 16 to 18 months.

(*c*) *Other methods of seasoning.*—All other methods, by which the timber was seasoned in the log, gave poor results.

(*d*) *General remarks.*—This timber has attracted a good deal of attention from time to time, owing to its strength, elastic properties and durability. It must, however, be borne in mind that it is neither plentiful nor procurable free from defects in long lengths.

(16) **Lagerstrœmia Flos-Reginæ** (Appendix IV-16).

(*a*) *Locality where tested.*—Chittagong Division, Bengal.

(*b*) *Best method of seasoning.*—The best results were obtained by girdling trees and allowing them to stand for one year, followed by conversion and a further period of seasoning in the plank for 6 to 12 months. The trees allowed to stand girdled for 2 years yielded equally good, though not better, material.

(*c*) *Other methods of seasoning.*—Mr. Homfray, who inspected this timber, states that very fair results were obtained by converting green logs, followed by seasoning in the plank or scantling. From the record in Appendix IV it will be seen that this method actually gave the best results, as the method of recording adopted does not take into consideration fine cracks, which occurred in about 50 per cent. of the pieces examined. Seasoning in the log, either on land or first immersed in water, with or without ends treated gave relatively poor results.

(*d*) *General remarks.*—This is an excellent timber, suitable for all kinds of internal and external construction, and one which finds a ready market when in good condition.

(17) **Lagerstrœmia microcarpa** (Appendix IV-17).

(*a*) *Locality where tested.*—North and West Divisions, Kanara, Bombay Presidency.

(*b*) *Best method of seasoning.*—According to the particulars in Appendix IV, the best way of seasoning this timber is to leave it in the log, with bark on and ends tarred for a year or two, and then to convert the logs and season the sawn material in the shade for a year. This method has resulted in 29 per cent. of split timber. Taking the experiments as a whole, seasoning in the log has resulted in excessive splitting, whereas water seasoning in the log has reduced this defect to a minimum.

The methods of seasoning advocated are either immersion of the logs in water for a year, land seasoning for 6 months, followed by conversion and seasoning for 6 months under shelter or conversion of green logs, immersion of the cut material for 3 months, followed by 9 to 12 months seasoning under shade in well-stacked piles. From the records it appears that insect attack is local, and if this assumption is correct, then either of the methods advocated should give nearly perfect results.

(*c*) *Other methods of seasoning.*—Converting green logs has resulted in 52 per cent. of the timber splitting badly. The two defects from which this timber has suffered while seasoning are excessive splitting and insect attack. The former defect is serious in all cases of land seasoning, without previous immersion in water, whereas water seasoning has reduced this trouble to a minimum. It will be noticed that all the timber, both land and water, seasoned on the coast in the West Kanara Division has been heavily attacked by insects.

(*d*) *General remarks.*—A very sound, strong timber, useful for construction, boat-building, shafts, etc. Care taken in seasoning this timber according to correct methods will well repay the trouble and expense incurred.

(18) **Lagerstrœmia parviflora** (Appendix IV-18).

(*a*) *Locality where tested.*—Kurseong Division, Bengal; and South Chanda Division, Central Provinces.

(*b*) *Best method of seasoning*—

(*i*) *Timber from the log.*—The best results were obtained by girdling trees and allowing them to stand for one year, followed by seasoning in the plank for 6 months to a year. Trees

allowed to stand for 2½ years were considerably damaged by borers.

(*ii*) *Pole wood.*—The best results were obtained either by felling in August, and seasoning the poles with bark on or by immersing the poles directly after felling, allowing them to remain in the water for 4 to 6 weeks and subsequent drying on land for upwards to a year.

(*c*) *Other methods of seasoning*—

(*i*) *Timber from the log.*—Little inferior to the results obtained by girdling in Kurseong, were those from experiments carried out in South Chanda, by which the logs were converted green and the material immersed in water for 5 to 9 months, followed by seasoning on land in a shed for a year or more. All methods by which the timber was seasoned in the log, resulted in excessive splitting.

(*ii*) *Pole wood.*—There is little difference in the poles felled in January and April, and seasoned either with or without bark; they were all in very fairly good condition.

(*d*) *General remarks.*—This timber is naturally very faulty and therefore is not suitable for cutting into planks; on the other hand, if properly seasoned, it produces moderately good rafters and scantlings and good posts.

(19) **Machilus odoratissima** (Appendix IV-19).

(*a*) *Locality where tested.*—Darjeeling Division, Bengal.

(*b*) *Best method of seasoning.*—Mr. Gent, who inspected this timber, states that distinctly the best results have been obtained by girdling the trees, the logs from which have produced good sound timber. The trees require very careful girdling owing to the fluted nature of the stems. The girdling period is fixed at 3 years.

(*c*) *Other methods of seasoning.*—Seasoning the timber in the log, with bark off and untreated ends, yielded timber little inferior to that obtained from girdled trees, while logs with treated ends and bark on were attacked by fungus, due no doubt to retention of moisture in the timber. Converting the timber from green logs and water seasoning both gave poor results.

(*d*) *General remarks.*—A good sound timber, useful for internal construction.

(20) **Michelia Champaca** (Appendix IV-20).

(*a*) *Locality where tested.*—Kurseong Division, Bengal.

(*b*) *Best method of seasoning.*—The best results were obtained by girdling the trees and allowing them to stand for 2½ years, followed

by 6 months' seasoning in the plank or scantling, while by girdling for only 1 year nearly equally good results were obtained.

(*c*) *Other methods of seasoning.*—Seasoning in the log, either with ends treated or untreated, resulted in a considerable amount of splitting. Conversion from green logs gave very poor results, while immersion of the logs in water gave no better results than land seasoning in the log.

(*d*) *General remarks.*—Converted planks and scantlings should be stored under shelter, as the timber is liable to deteriorate from fungus attack. It is also somewhat liable to attack by borers, if seasoned in the log.

(21) **Morus indica** (Appendix IV-21).

(*a*) *Locality where tested.*—Lahore Division, Punjab.

(*b*) *Best method of seasoning.*—The best results have been obtained by girdling the trees and allowing them to stand for 12 months, followed by 6 to 12 months' seasoning in the plank or scantling, but even this treatment does not obviate the tendency of the wood to warp.

(*c*) *Other methods of seasoning.*—Slightly inferior to the timber obtained from girdled trees, was that from logs seasoned with bark on and the ends treated with Loracine. Logs, the ends of which were treated with either tar or cowdung and mud gave poor results, which indicates that such substances are not sufficiently dense for use in very hot climates. Timber converted from green logs was of poor quality.

(*d*) *General remarks.*—The chief defect in this timber is its tendency to warp badly. This can be overcome to a great extent by careful quartering of the logs and by never including the whole core of the tree in a scantling or beam. The timber is used by the trade for sporting requisites and small articles such as bedstead legs, when slight warping is of no great consequence.

(22) **Ougeinia dalbergioides** (Appendix IV-22).

(*a*) *Locality where tested.*—North Division, Kanara, Bombay; and South Chanda Division, Central Provinces.

(*b*) *Best method of seasoning*—

(*i*) *Timber from the log.*—The best results obtained in Bombay were by either seasoning in rough squares for a year or more and subsequent seasoning in the plank for a year or by converting the logs when green and seasoning in the plank for 12 to 18 months. In South Chanda the best results were obtained by felling either in January or August, and seasoning in the log for a year, followed by 6 to 12 months'

seasoning in the plank. A reference to Appendix IV will show that in no instance was splitting serious, though attack by borers was in some cases severe.

(*ii*) *Pole wood.*—Poles were felled in January, April and August, while others were felled in January and at once immersed in water. In all cases, the results were equally satisfactory.

(*c*) *Other methods of seasoning*—

(*i*) *Timber from the log.*—Slightly inferior to the results enumerated above, were those obtained by immersing the logs in water for three months and seasoning for a year on land, followed by 6 months' or more seasoning in the plank. The South Chanda Experiments show that if the timber is seasoned in the log, it must be barked; otherwise, it is very liable to attack by borers. The season of felling does not appear to affect the timber, nor do the results of other experiments differ very much from those already mentioned, as this timber is not liable to excessive splitting.

(*ii*) *Pole wood.*—Nil.

(*d*) *General remarks.*—Internal defects especially near the centre are very common in this timber; it, therefore, follows that the core should be rejected in conversion. The timber should be stored under cover to preserve its good appearance and colour. This timber produces excellent cart-shafts, axles and building material from the log and good poles and posts from small trees.

(23) **Pinus longifolia** (Appendix IV-23).

(*a*) *Locality where tested.*—Rawalpindi and Kangra Divisions, Punjab.

(*b*) *Best method of seasoning.*—The best results have been obtained both in Rawalpindi and Kangra by converting green logs into sleepers, scantlings and boards. A period of not more than 12 months' seasoning for converted material is advocated: the timber should preferably be carried out under cover.

(*c*) *Other methods of seasoning.*—Seasoning in the log, with or without ends treated, has given quite good results in some cases and bad in others; though, generally speaking, cracking is more prevented than in the case of timber cut from green logs. Barking logs has a bad effect, resulting in excessive splitting and often serious damage by borers. Mr. Wright, who inspected the Kangra experiment, states that by removing the bark from logs the oils and resins evaporate quickly and thus remove protection from insect attack. The material converted from green logs, on the other hand, exudes much resin at the ends

and on the surface which, in his opinion, is the reason for such timber being immune from insect attack.

"S" clamps were attached to some of the B. G. sleepers prepared from green logs; in Rawalpindi the sleepers, with or without such clamps, were in much the same condition, while in Kangra, those fitted with these clamps were considerably more split than those without.

(*d*) *General remarks.*—Chir timber, and especially that from the Eastern zone, is very liable to warp. Converting the material from green logs certainly reduces the tendency to do so (see Forest Bulletin No. 37 of 1917, on "Contraction and Warping of *Pinus longifolia* timber"). To further obviate this tendency to warp, sleepers, scantlings and boards should be stacked in piles built up as high as practicable in order to take every advantage of weighting the timber.

(24) **Pterocarpus Marsupium** (Appendix IV-24).

(*a*) *Locality where tested.*—Sambalpur, Bihar and Orissa; North Division, Kanara, Bombay; and South Chanda Division, Central Provinces.

(*b*) *Best method of seasoning.*—By converting green logs into planks and scantlings, which should be immersed in water for 6 weeks in the case of running water and up to 4 months, if stagnant, followed by seasoning on land for 12 months, in well-stacked open piles, if possible under cover.

(*c*) *Other methods of seasoning.*—The next best results were obtained by converting green logs, not followed by immersion in water. Seasoning in the log on land, or by first immersing the logs in water, did not result in excessive splitting, though this defect was more marked in the case of logs without than with bark on. Seasoning by any method in the log renders the timber very liable to bad discolouration, which is nearly entirely overcome by immersing converted material in water.

(*d*) *General remarks.*—The timber is liable to be faulty in the centre and, therefore, when converting logs, the core, *viz.*, a $4'' \times 4''$ rafter, should first be cut out. One of the great defects of this timber is the objectionable colouring matter, which debars its use for furniture and other purposes. Water seasoning of converted material overcomes this difficulty to a large extent. In order to ascertain the effect of immersion on timber experimented with at Sambalpur, shavings were cut out of (i) planks which had been immersed in water for 4 months, and subsequently seasoned on land, (ii) planks cut from logs which had been immersed for 4 months and subsequently seasoned on land and (iii) planks cut from logs seasoned on land. To the three samples of shavings equal parts of water were added and each gently warmed and

mulsed in order to extract the colouring matter from the chips. The result was that sample (ii) gave a deep red purple decoction, the colour from sample (iii) was of slightly greater density than that of sample (ii), while sample (i) yielded a pale light yellow colour. The general appearance of all three sets of planks fully corroborated the above results.

(25) **Schima Wallichii** (Appendix IV-25).

(*a*) *Locality where tested.*—Kurseong Division, Bengal.

(*b*) *Best method of seasoning.*—Markedly the best results were obtained by girdling the trees and allowing them to stand for 18 months, which should be followed by a six months' seasoning period in the plank. Allowing the trees to stand girdled for $2\frac{1}{2}$ years did not give quite such good results as the above.

(*c*) *Other methods of seasoning.*—Fair to good results were obtained by converting green logs, followed by seasoning in the plank. The various methods tried by which the timber was seasoned in the log gave poor results, the timber being attacked by fungus.

(*d*) *General remarks.*—The local idea is that this timber does not yield good planks, but this idea is not corroborated by results obtained from girdled timber, which yields excellent planks and scantlings. As the timber is liable to fungus attack while seasoning, it should be stored under cover.

(26) **Shorea robusta** (Appendix IV-26).

(*a*) *Locality where tested.*—Haldwani Division, United Provinces; and Singhbhum Division, Bihar and Orissa.

(*b*) *Best method of seasoning.*—No very definite results have been obtained. Mr. Collier, who inspected the Haldwani timber, is of opinion that seasoning in the log, in the shade for 20 months followed by 12 months' seasoning of the converted material, gave the best results. Mr. Dodsworth who inspected the timber in Singhbhum, considers that the best results were obtained by immersing the logs in water for 4 months, followed by 14 months' seasoning on land and subsequent conversion, and seasoning the converted material under cover for a year.

(*c*) *Other methods of seasoning.*—By whatever method the timber is seasoned, heavy splitting has not taken place, though a fair amount of slight splitting and, in some cases, warping has occurred. From all the evidence available it does not appear that water seasoning has given sufficiently definite results to justify the adoption of this method of seasoning. Green conversion has not given results much inferior to

seasoning in the log. The only marked point brought out by the experiments is that in Singhbhum seasoning in the log has resulted in serious damage by borers.

(*d*) *General remarks.*—The timber is too well known to require description.

(27) **Stephegyne parvifolia** (Appendix IV-27).

(*a*) *Locality where tested.*—South Chanda Division, Central Provinces.

(*b*) *Best method of seasoning.*—The best results, which were even then not altogether satisfactory, were obtained by girdling trees and leaving them standing for 18 months, followed by 6 months' seasoning in the plank.

(*c*) *Other methods of seasoning.*—The season of felling does not appear to affect the timber. All timber seasoned in the log, either with bark on or with bark off, suffered from borers. Water seasoning in the log gave poor results.

(*d*) *General remarks.*—Conversion of green logs, followed either by seasoning in a shed or immersion in water for 6 to 8 weeks might give even more satisfactory results than girdling and should be tried.

(28) **Tectona grandis** (Appendix IV-28).

(*a*) *Locality where tested.*—South Chanda, Central Provinces.

(*b*) *Best method of seasoning*—

(*i*) *Timber from the log.*—The best results were obtained by girdling trees and leaving them standing for 2 to 3 years, followed by a 15 months' seasoning period in the plank after conversion.

(*ii*) *Pole wood.*—The best results were obtained by felling in August, immersing the poles at once in water for 2 to 3 months, followed by seasoning on land for 9 months.

(*c*) *Other methods of seasoning*—

(*i*) *Timber from the log.*—Cracking was excessive in timber cut from logs felled in January and April, but not so marked in that felled in August. Green logs immersed in water for three months produced timber which was seriously cracked.

(*ii*) *Pole wood.*—Poles felled in January and April, and seasoned either with bark on or with bark off, were badly cracked; those felled in August were not so badly cracked as the above but more so than water seasoned poles.

(*d*) *General remarks.*—When reviewing the results of these experiments, it must be borne in mind that they probably only apply to Teak grown in the dry zone and seasoned in a locality where temperatures

run high from March to June. There are, however, extremely instructive in that they show that even a timber of the quality and high reputation of Teak requires careful treatment.

(29) **Terminalia Arjuna** (Appendix IV-29).

(*a*) *Locality where tested.*—South Chanda Division, Central Provinces; and Jhansi Division, United Provinces.

(*b*) *Best method of seasoning.*—In South Chanda, equally good results were obtained by felling in January and seasoning in the log, with bark on, for 24 months followed by seasoning in the plank for a year and by girdling the trees and allowing them to stand for 24 months, followed by seasoning in the plank for a year. In Jhansi Division the best results were obtained by converting green logs, and seasoning the planks under cover for 24 months. In the Chanda experiments 85 per cent. and in the Jhansi experiments 76 per cent., of sound timber was obtained from seasoning by the above described methods.

(*c*) *Other methods of seasoning.*—Logs felled either in April or August yielded timber which cracked considerably, while those logs which were seasoned with bark on suffered from borers. Logs left in the forest in the shade, suffered from borers, especially the sap-wood which was entirely destroyed. Logs immersed in water, warped and cracked seriously both in Chanda and Jhansi.

(*d*) *General remarks.*—The timber is liable to warp badly, so should be stacked in as high piles as permissible. It is a good sound timber if properly seasoned, more suitable for scantlings and posts than for planking.

(30) **Terminalia belerica** (Appendix IV-30).

(*a*) *Locality where tested.*—Kurseong Division, Bengal.

(*b*) *Best method of seasoning.*—The only satisfactory method of dealing with this timber is to girdle the trees and to leave them standing for 12 to 18 months, followed by felling and conversion and subsequent seasoning for a short period in a shed.

(*c*) *Other methods of seasoning.*—All other methods of seasoning yielded rotten timber due to fungus and insect attack. Converting green logs, immersing the sawn material at once in water, followed by seasoning in a shed was not tried, though it is thought that it might yield good results.

(*d*) *General remarks.*—This is a low grade timber though, if properly handled, it would no doubt yield fair rafters for internal work, if well protected by paint or creosote.

(31) **Terminalia paniculata** (Appendix IV-31).

(*a*) *Locality where tested.*—North and West Divisions, Kanara, Bombay Presidency.

(*b*) *Best method of seasoning.*—The methods which have given the best results are either by converting the logs when green and storing the sawn material for 12 to 18 months under cover, or by immersing the logs in tidal creeks for a year, followed by 15 months' seasoning on land and subsequent conversion and a further short period of seasoning of the sawn material.

(*c*) *Other methods of seasoning.*—Seasoning in the log, on land, with or without bark and with or without ends treated with a protective substance resulted in excessive splitting.

(*d*) *General remarks.*—It is possible that converting green logs, followed by immersion for 2 or 3 months and subsequent seasoning in open stacks under cover, would give even better results than those enumerated above.

The timber is strong and suitable for construction rather than for high class work, such as furniture.

(32) **Terminalia tomentosa** (Appendix IV-32).

(*a*) *Locality where tested.*—South Chanda Division, Central Provinces; and Kheri Division, United Provinces.

(*b*) *Best method of seasoning*—

(*i*) *Timber in the log.*—Converting timber from green logs either with or without subsequent immersion in water and then seasoned in the shade for 12 to 18 months, gave by far the best results both in South Chanda and Kheri.

(*ii*) *Pole wood.*—Poles felled in August, and seasoned with bark on for 9 to 12 months have given the best results.

(*c*) *Other methods of seasoning*—

(*i*) *Timber in the log.*—The results of girdling trees were quite satisfactory in South Chanda, though the trees which were allowed to stand for over 2 years were seriously damaged by borers. Fair to good results were also obtained in both divisions by immersion of the timber in the round for upwards to 3 months, though conversion of green logs and immersion of the sawn material is distinctly preferable. All methods of seasoning in the log on land gave relatively poor results. It was noticeable that the timber seasoned with bark on suffered much more heavily from insect attack than that with bark off.

(*ii*) *Pole wood.*—*Terminalia tomentosa* poles do not appear to be subject to excessive cracking while seasoning, though those felled in January and April are not in quite such good condition as those felled in August. Poles immersed in water after felling cracked badly.

(*d*) *General remarks.*—The question of ascertaining the best ways of dealing with this timber is of great importance, as large quantities are available from most parts of British India : while it is a sound strong timber, very useful for construction, bridging and sleepers after treatment and for many other purposes. It is more suitable for posts, beams and scantlings than for boards, though suitable for cutting into thick planks for bridging, etc. It should never be allowed to lie in the log longer than is absolutely necessary.

(33) **Xylia xylocarpa** (*West Coast*) (Appendix IV-33).

(*a*) *Locality where tested.*—North and West Divisions, Kanara, Bombay Presidency.

(*b*) *Best method of seasoning.*—The best results have been obtained by immersing the logs for a year in tidal creeks, followed by seasoning the logs on land for 9 months, and subsequent conversion and seasoning for a short period in open stacks under cover. Where water seasoning is not feasible the logs must be converted as soon after felling as possible.

(*c*) *Other methods of seasoning.*—All ways by which the timber is seasoned in the log results in upwards to 100 per cent. of split material. Conversion of green logs, followed by water seasoning for about 3 months and subsequent seasoning on land was not tried, though it is thought that good results could be obtained by this method.

(*d*) *General remarks.*—A strong timber, though difficult to season ; useful for construction, sleepers, paving-blocks, etc.

APPENDIX I.

SCHEME ACCORDING TO WHICH THE EXPERIMENTS WERE CARRIED OUT.

[*Enquiry No. 8* (c) *of the Triennial Programme of work for 1916 to 1919.*]

Chief Conservators and Conservators of Forests were recently requested to inform this office of any experiments carried out and methods employed in their Provinces and Circles by which timber is seasoned, to make suggestions as to the species to be tested and the lines along which the enquiry should be carried out, while all Sawmill managers and large firms in India and Burma were also addressed on the subject. From the replies received it appears that the seasoning of timber is not commonly practised in India, though some useful information is available from experiments carried out locally. The reports received from the various provinces show that the local officers look upon such an enquiry as is now proposed as being of very considerable importance, and many proposals have been made by the Conservators and Divisional Forest Officers as to the species to be tested and the lines along which the experiments should be carried out. In dealing with so extensive an experiment it will, therefore, be necessary to ask each province to co-operate with the Forest Research Institute in carrying out the enquiry with those species of timber in which they are especially interested.

The importance of such an enquiry is too well known to require anything further being said in justification of its being taken up, for not only does proper seasoning increase the durability of the timber and in a large measure reduce its tendency to slipt, warp and shrink, besides being absolutely necessary in connection with treating timber, but it is thought that many trial lots of timber which have been submitted from time to time to timber dealers and firms for testing or for introducing as new timbers on the market have been pronounced unsuitable for the purpose owing to their tendency to warp, crack or contract for want of proper seasoning.

2. After perusal of the available literature on the subject, it is proposed to carry out an enquiry on the following points :—

To determine the relative merits of seasoning timber under the following conditions :—

(*i*) (*a*) The effect on the timber of certain species by girdling the trees before they are felled.

(*b*) Seasoning in the open.

(*c*) Seasoning under shelter with a free circulation of air.

(*d*) Seasoning first in water and afterwards under shade, with free circulation of air.

(*e*) The effect of burying timber in the tidal creeks and then seasoning under shade in the open.

(*ii*) The effect of felling at different times of the year, and in this connection (*a*) to ascertain the best season of the year in which to fell timber, (*b*) to ascertain the amount of moisture in the sap and heart-wood respectively at different periods of the year, (*c*) to ascertain the rate of absorption and re-evaporation of moisture from timber immersed in water, *i.e.*, after having been dried under shade in the open, (*d*) to ascertain the rate of seasoning of the timber under heads (*i*) (*a*) to (*c*), and (*e*) to ascertain the relative absorption of water by green and seasoned timber.

(*iii*) The effect produced by converting certain timbers when green and in a dry state, and in this connection the best methods of—

(*a*) Seasoning and stacking such timber.

(*b*) To study the question of the discolouration of timber converted before or after seasoning.

(*c*) To study the question of immersion of timber in connection with discolouration.

(*iv*) To study the results obtained by applying Ligno, Loracine, tar and cowdung to the ends of logs while seasoning and the use, if any, of metal clamps to prevent timber in the log and when converted into sleepers, from splitting.

(*v*) To study the amount of contraction across the grain which takes place in timber of various species while seasoning.

(*vi*) To study the effect of barking trees on the mode and rate of seasoning.

3. In order to carry out so extensive an enquiry as is outlined above, and especially as many portions of the enquiry will extend over several years, it is absolutely necessary to work out in detail each item of enquiry and to select such species with which to carry out the investigation, as will ultimately give the most useful results to the Department. The Conservators in answering the letter addressed to them on this subject have suggested species with which, in their opinion, test should be made and. in the majority of cases, these will be dealt with in this enquiry.

4. The lines on which it is proposed to deal with the above heads and sub-heads of enquiry are as follows :—

I.—Burma.

Based on the reports received from the Chief Conservator of Forests, and his Conservators it is proposed to ask them—

(*i*) (*a*) to girdle 6 trees of :—(1) *Lagerstrœmia Flos-Reginæ*, (2) *Gmelina arborea*, (3) *Dipterocarpus alatus*, (4) *Dipterocarpus tuberculatus*, (5) *Cedrela Toona*, (6) *Pterocarpus macrocarpus*, (7) *Schleichera trijuga*, (8) *Pentacme suavis*, (9) *Melanorrhœa usitata*, (10) *Hopea odorata*, (11) *Berrya Ammonilla, and* (12) *Adina cordifolia*. To convert the above timber into planks and scantlings after being girdled for 3 years and then felled, in order to compare it with the converted material prepared according to the methods described below.

(*ii*) To fell six other trees of each of the above species, in order to (*i*) (*e*) prepare logs from the same 6 ft. long, and season two of each according to (*i*) (*b*), (*i*) (*c*), (*i*) (*d*) and (*i*) (*e*) ; after these logs are seasoned, they will be converted into planks to be compared with those to be converted green as described in the next para.

(*iii*) (*a*) To convert green logs into planks of the above twelve species and also of (13) *Xylia dolabriformis* and (14) *Fagrœa fragrans* which will be (1) stacked in the shade in open piles and weighted above. (2) First immersed in water for six weeks after conversion and then stacked in open piles in the shade.

(*iv*) To prepare 10 M. G. sleepers of (1) *Dipterocarpus alatus*, (2) *Dipterocarpus tuberculatus*, (3) *Xylia dolabriformis*, (4) *Schleichera trijuga*, (5) *Lagerstrœmia Flos-Reginæ*, (6) *Pentacme sauvis* from—

(*a*) Green logs.
(*b*) Seasoned logs.
(*c*) Logs treated with Loracine or Ligno and then seasoned.
(*d*) Logs treated with cowdung and tar mixed and then seasoned.
(*e*) Seasoned logs and fix iron " S " shaped clamps to each end of the sleeper after preparation. Such an experiment will entail the preparation of 300 M. G. sleepers.

II.—Bihar and Orissa.

The Conservator of Forests, Bihar and Orissa, requests that enquiries may be made as to the seasoning properties of Sâl (*Shorea robusta*) and Bija (*Pterocarpus Marsupium*). As regards Sâl, experiments are already in progress at Dehra Dun which cover (*i*) (*a*), (*i*) (*b*) and (*i*) (*c*), also (*ii*) (*a*) and (*ii*) (*b*), so need not be repeated. It is proposed to request the Conservator to fell 6 trees of Sal and Bija, the logs from which will be treated as follows :—

(*i*) (*d*) To season 6 logs, first in water and afterwards under shade with free circulation of air.

(*iii*) (*a*) (1) To convert the above logs, after seasoning, into planks and stack them in open piles, under shade.

(2) To convert green logs of the above species into planks and stack them in open piles, under shade.

(3) To convert 6 green logs of the above species into planks, immerse them in running water for six or eight weeks, and then season in open piles, under shade. It may be necessary to leave the Bija planks longer in water so as to get rid of the objectionable colouring matter.

(*iv*) & (*vi*) To prepare logs 6 ft. long of Sâl and Bija, 3 for each of the following experiments, to be seasoned :—

(*a*) Without ends treated, with bark on.

(*b*) Without ends treated, with bark off.

(*c*) With ends treated with cowdung and tar mixed, with the bark left on.

(*d*) With ends treated with Loracine or Ligno, with the bark left on.

III.—United Provinces.

The Conservators of the United Provinces recommended the following species for experiment :—(1) *Shorea robusta*, (2) *Terminalia tomentosa*, (3) *Bombax malabaricum*, (4) *Albizzia Lebbek*, (5) *Dalbergia Sissoo*, (6) *Bassia latifolia* and (7) *Terminalia Arjuna*.

Experiments with hill and plains grown United Provinces Sâl, cut at different seasons of the year, are in progress, so need not be repeated. The following experiments are therefore suggested :—

(*i*) (*d*) Seasoning 6 logs, 6 ft. long of the above species, by complete immersion in water for 4 months, and afterwards under shade until they are air dry, and at the same time to lay down 6 logs of each species to season in the shade. The

relative merits of above two methods of seasoning can then be compared.

(*iii*) (*a*) To convert green logs of all the above 7 species into planks and season them, piled in open stacks with weights above. Also to convert into planks the logs after they are seasoned according to methods suggested under (*i*) (*d*) and to compare their state, when dry, with the boards converted from green logs.

(*b*) & (*c*) In carrying out the above experiments special attention will be paid to the question of discolouration of *Bombax malabaricum*, the logs of which will have to be entirely immersed during the water-seasoning process.

IV.—Central Provinces.

The Chief Conservator of Forests and Conservators of Forests of the Central Provinces in their reports on seasoning timber lay special stress on felling in the rains and water-seasoning. The following experiments are proposed to be carried out in the Central Provinces with (1) Teak, (2) *Terminalia tomentosa*, (3) *Pterocarpus Marsupium*, (4) *Lagerstrœmia parviflora*, (5) *Diospyros Melanoxylon*, (6) *Ougeinia dalbergioides*, (7) *Terminalia Arjuna*, (8) *Adina cordifolia, and* (9) *Stephegyne parvifolia.*

(*i*) (*a*) To girdle 10 trees of each of the above species to determine the mode of seasoning by doing so.

(*d*) Seasoning poles of the above species in water for 2 to 4 months, and afterwards in open stacks in the shade, and placing a similar number of poles of each species to season in the shade without previously being immersed in water, this for comparison.

(*ii*) (*a*) To fell poles of the above species in January, April and August or September, and place them to season, some with bark on and some stripped, stacked in open piles in shady places.

(*b*) To ascertain the amount of moisture in the timber felled in January, April and August (*a*) at time of felling the trees mentioned in (*ii*) (*a*) and (*b*) when seasoned, *i.e.*, to form an idea of the rate of seasoning. *

(*vi*) In connection with (*ii*) (*a*) to study the effect on the timber of barking and not barking poles when seasoning.

* NOTE:—The moisture tests will be carried out at Dehra Dun.

V.—Bombay.

The Conservators of Forests, Northern and Southern Circles, and their Divisional Forest Officers make certain suggestions as regards experiments which might be carried out. Based on these reports, the following are suggested :—

(*i*) (*a*) To girdle 6 of each of the following species—(1) *Terminalia paniculata*, (2) *Lagerstrœmia microcarpa*, (3) *Pterocarpus Marsupium*, (4) *Dalbergia latifolia*, (5) *Grewia tiliaefolia*, (6) *Adina cordifolia*, (7) *Ougeinia dalbergioides*, (8) *Xylia xylocarpa*, (9) *Bassia longifolia*.

(*c*) Seasoning 6 logs of each of the above species under a shelter, 3 being roughly squared, and 3 left in the round.

(*e*) To bury 6 logs of No. 1, 2, 6 and 8 in mud in a tidal creek, for 6 or 8 months, and afterwards leave them to season in a shady place.

(*iv*) To lay down 6 logs of the above 9 species—(*i*) with ends treated with Ligno or Loracine, (*ii*) with tar and (*iii*) with mud and cowdung. These logs to be seasoned with bark on, and in the same place as those mentioned under (*i*) (*c*).

(*iii*) (*a*) To convert green logs into planks of the above species and to convert all the logs mentioned under (*i*) (*a*), (*i*) (*c*), (*i*) (*e*) and (*iv*) into planks after they are seasoned, so as to compare the value of the different methods of seasoning.

VI.—Bengal.

The Conservator of Forests and his Divisional Forest Officers propose several experiments to be made with different species, based on which the following experiments are suggested :—

(*i*) (*a*) To girdle 6 trees of—(1) *Artocarpus Chaplasha*, (2) *Cedrela Toona*, (3) *Anthocephalus Cadamba*, (4) *Michelia Champaca*, (5) *Terminalia belerica*, (6) *Chickrassia tabularis*, (7) *Schima Wallichii*, (8) *Dillenia pentagyna*, (9) *Gironniera reticulata*, (10) *Lagerstrœmia parviflora*, (11) *Albizzia* spp., (12) *Lagerstrœmia Flos-reginæ* and (13) *Duabanga sonneratioides*, and afterwards convert the logs into boards and stack them in open piles.

(*d*) To season logs of the above species in water, with bark off, for 3 to 6 months, then allow them to dry in a shady place and finally convert them into boards stacked in open piles.

(*iii*) To convert green logs of the above species into planks and store in open piles.

(*iv*) To lay down logs of the above species with bark on and the ends smeared, (*i*) with Loracine or Ligno, (*ii*) with tar or cow-dung and earth, and after seasoning to convert them into planks and stack the same in open piles.

(*v*) In order to compare the relative merits of the above methods of seasoning, to lay down a few logs of each species to season with bark off in the open.

VII.—Assam.

(*iii*) (*a*) to (*c*) To attempt to find out methods of preventing discolouration of tea-box woods such as *Bombax malabaricum* and *Tetrameles nudiflora.* Such experiments will have to be carried out, in the first place, on a laboratory scale at Dehra Dun, after which it may be possible to lay down definite lines along which further enquiry should be carried out. The Conservator of Forests, Western Circle, makes no suggestions as to other experiments but were he to care to do so, after perusing the proposals made for experiments in other Provinces, they could be added to this scheme of enquiry.

VIII.—Punjab.

The Conservator of Forests, Punjab, expresses a wish that seasoning experiments should be carried out with (1) *Dalbergia Sissoo,* (2) *Morus indica,* (3) *Terminalia tomentosa,* (4) *Lagerstrœmia parviflora* and (5) *Eucalyptus* spp.; he also forwards several valuable records of experiments submitted by the Divisional Forest Officers. Based on these suggestions, it is proposed to carry out the following experiments :—

(*i*) (*a*) To ascertain the effect of girdling trees of species Nos. 1, 2 and 5.

(*i*) (*c*) & (*vi*) To season logs of all the above five species, plus *Pinus longifolia,* in the shade with bark off and afterwards converting them into planks and scantlings.

(*iii*) To ascertain the effect of converting green logs of the above species, plus *Pinus longifolia,* into boards and scantlings and stacking them carefully in open piles, weighted on the top.

(*iv*) & (*vi*) To season logs of the above species, and also (6) *Pinus longifolia* with bark on, and the ends protected (*i*) with Loracine or Ligno, (*ii*) with tar, (*iii*) with cowdung and earth, and afterwards converting the logs of species Nos. 1, 2, and 4 into planks and boards and Nos. 3, 5, and 6 into sleepers with "S" clamps fitted to the ends.

IX.—Madras.

The Conservators of Forests in Madras make no suggestions; if, however, they wish experiments carried out, they can be added to this scheme.

APPENDIX II.

Form I.—Seasoning enquiry—Form in which to enter results of Experiments under heads (i) (a) to (i) (e), (iii) (a), (iv) and (vi).

Serial No. of log.	Mode of seasoning to be adopted.	Species.	Size of tree, log, sleeper, board or scantling.	Date of felling the tree.	Date of girdling the tree.	Date of laying down to season, either on land, or in water or in tidal creek.	Date of removal from water or tidal creek.	Date of conversion into planks and scantlings.	Date of inspection.	Inspection notes.
1	2	3	4	5	6	7	8	9	10	11

Form II.—Seasoning enquiry—Form in which to enter results of Experiments under head II.

Serial No. of log.	Mode of seasoning to be adopted.	Species.	Size of tree or log.	Date of felling.	Percentage of moisture in timber on date of felling.		Percentage of moisture in timber when seasoned.		Date of inspection.	Inspection note.
					Heartwood.	Sapwood.	Heartwood.	Sapwood.		
1	2	3	4	5	6		7		8	9

APPENDIX III.

Inspection note— *Interim report ;* / *Final* *Date of inspection.*

Name of Division..........................

Head of Experiment..........................

Species..........................

DESCRIPTION OF SPECIMEN.			Sound in all respects.	SLIGHTLY SPLIT.		BADLY SPLIT.		Surface cracks.	Slightly warped.	Badly warped.	Discolour-ation, if any.	Insect attack, if any.	Per cent. of moisture at time of inspection.	REMARKS.
No. on log.	No. on converted timber.	Size of log or converted timber.		One end.	Other end.	One end.	Other end.							
1			2	3		4		5	6	7	8	9	10	11

NOTE.—(1) By "slightly split" should be understood a crack of under 1 ft. in length and not over ⅛ in. broad, otherwise it should be recorded under "Badly cracked."

(2) Surface cracks, as occur for instance in Sal, should be recorded by stating the number per foot across the grain at a point where about the average number occur.

(3) "Slightly warped" should include only serviceable timber. "Badly warped" means unserviceable timber for carpentry or constructional purposes.

(4) Moisture tests will be arranged for by the Forest Economist either by obtaining sample planks or rafter or by obtaining samples of the timber in closed specimen tubes and carrying out the moisture tests at Dehra Dun.

APPENDIX IV.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(1) *Adina cordifolia*	N. D. Kanara, Bombay.	Natural seasoning in log, with bark on and then converted.	27	17·49	60	33	..	7	Fair.
Ditto	Do.	Seasoned in rough squares and then converted.	30	..	80	20	..	..	Do.
Ditto	Do.	Seasoned in log, with ends coated with Loracine and then converted.	28	..	67	29	..	7*	Do.
Ditto	Do.	Seasoned in log, with a cut to centre, and then converted.	20	..	80	20	..	..	Do.
Ditto	Do.	Seasoned in log, with ends treated with cowdung and mud and then converted.	29	..	30	65	3	3*	Poor.
Ditto	Do.	Converted green, and seasoned in plank.	**23**	**19·25**	**83**	**17**	..	..	Good.
Ditto	Do.	Seasoned in log, with ends treated with tar, and then converted.	33	16·17	70	30	..	..	Fair.
Ditto	W. D. Kanara, Bombay.	Seasoned in log, in shade, for 21 months, then converted in October and seasoned in planks and scantlings for 18 months.	10	..	50	40	..	10	Surface cracking slight, discolouration *nil*.
Ditto	Do.	Seasoned in log, in shade for 27 months, then converted in April and seasoned in planks and scantling for 12 months.	**6**	..	**83**	**17**	..	..	Some surface cracking, no discolouration.
Ditto	Do.	Logs immersed in tidal creek for 12 months, then seasoned in log on land for 9 months, converted in October and seasoned in plank and scantling for 18 months.	21	..	66	20	5	15*	Somewhat discoloured and about 50 per cent. of the pieces very slightly warped.
Ditto	Do.	Logs immersed in tidal creek for 12 months, then seasoned in log on land for 15 months, converted in April and seasoned in plank and scantlings for 12 months.	47	..	54	32	10	6*	A good deal of discolouration and a high percentage of pieces slightly cracked.
Ditto	S. Chanda, Central Provinces.	Felled in January, seasoned with bark off in log, and then converted.	17	..	36	53	..	17*	Poor.
Ditto	Do.	Felled in January, seasoned with bark on in log and then converted.	19	..	15	68	..	53*	Do.
Ditto	Do.	Felled in April, seasoned in log with bark off, and then converted.	18	..	..	100	..	..	Very poor.
Ditto	Do.	Felled in April, seasoned in log with bark on and then converted.	15	..	14	40	..	73*	Poor.
Ditto	Do.	Felled in August, seasoned in log with bark off and then converted.	15	..	14	86	..	..	Do.
Ditto	Do.	Felled in August, seasoned in log with bark on and then converted.	16	16·78	..	86	..	93*	Very poor.
Ditto	Do.	Logs seasoned in water for 3 months, and on land for 17 months and then converted.	46	18·10	42	50	..	10*	Fair.
Ditto	Do.	Girdled for 22 months, then felled and converted.	**18**	**17·83**	**73**	**22**	..	5	Good.
(2) *Albizzia odoratissima*	Lansdowne Division, United Provinces.	Log seasoned in water for 4 months and then converted.	20	19·73	50	50	..	..	Fair.
Ditto	Do.	Logs seasoned in water for 4 months, and on land for 15 months and then converted.	14	13·09	50	50	..	..	Do.
Ditto	Do.	Natural seasoning in log for 2 years and then converted.	**26**	**12·67**	**81**	**19**	..	..	Do.

*Note.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(2) *Albizzia odoratissima* —contd.	Lansdowne Division, United Provinces.	Natural seasoning in log for 19 months and then converted.	16	18·42	75	25	..	..	Good.
(3) *Albizzia procera* .	Kurseong Division, Bengal.	Trees girdled for 1 year, then felled and converted, and seasoned for 1 year and 9 months.	43	..	65	28	..	9*	Do.
Ditto . .	Do. .	Trees girdled for 2 years, then felled and converted, and seasoned for 9 months.	50	..	78	22	..	..	Do.
Ditto . .	Do. .	Trees girdled for 2 years and 9 months, converted and then inspected.	31	..	72	22	..	6	Do.
Ditto . .	Do. .	Log seasoned in water for 5 months, on land for 13 months, and then converted.	38	26·27	84	16	..	..	Do.
Ditto .	Do. .	Seasoned in log for 12 months, with ends tarred, then converted and seasoned in plank for 21 months.	31	27·78	97	3	..	..	Do
Ditto . .	Do. .	Seasoned in log for 18 months, with ends tarred, then converted and seasoned in plank for 15 months.	42	..	71	29	..	2*	Do.
Ditto . .	Do. .	Seasoned in log for 2 years and 6 months, with ends tarred, converted and seasoned in plank for 3 months.	42	..	81	19	..	..	Do.
Ditto . .	Do. .	Seasoned in log for 1 year, with ends treated with Loracine, then converted and inspected after 21 months.	17	..	83	17	..	..	Do.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
Ditto . .	Do. .	Seasoned in log for 18 months with ends treated with Loracine, then converted and inspected after 15 months.	24	32·64	84	12	..	4	Do.
Ditto . .	Do. .	Seasoned in log for 2½ years, with ends treated with Loracine, then converted and inspected after 3 months.	23	..	96	4	..	..	Do.
Ditto . .	Do. .	Converted green and seasoned in plank for 2 years and 9 months.	28	25·23	100	..	..	..	Very good.
(4) *Anthocephalus Cadamba.*	Do. .	One set of trees girdled for 8 months, another for a year and in both cases converted material stored so as to make up a period of 2 years and 9 months.	..	..	..	..	..	..	That portion of the timber, which, when stacked was protected by that above from excessive moisture is sound, the rest absolutely rotten.
Ditto . .	Do. .	Seasoned in log for 18 months, with bark off, and in plank for 15 months.	..	..	..	..	..	..	All rotten, fungus attack.
Ditto . .	Do. .	Converted green and seasoned for 2 years and 9 months.	..	..	..	..	..	..	Do.
Ditto . .	Do. .	Seasoned in log immersed in water for 3½ months, on land for 14½ months, then converted and seasoned in planks for 15 months.	..	..	..	..	..	..	Do.
Ditto . .	Do. .	Seasoned in log for varying periods, with ends tarred and then converted and planks stacked.	..	..	..	..	..	..	Do.
Ditto . .	Do. .	Seasoned in log for varying periods, with ends treated with Loracine, then converted and planks stacked.	..	..	..	..	..	..	Do.
(5) *Artocarpus Chaplasha.*	Do. .	Seasoned in the open in log for 18 months, with bark off, converted and seasoned in planks for 15 months.	52	18·31	71	25	6*	..	Very fair.

* Note.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(5) *Artocarpus Chaplasha*—contd.	Kurseong Division, Bengal.	Converted green and seasoned for 2 years and 9 months.	24	..	71	21	8	..	Very fair.
Ditto	Do.	Seasoned in log and immersed in water for 5 months, on land for 13 months, converted and seasoned in planks for 15 months.	15	19·81	60	13	40*	..	Fair.
Ditto	Do.	Trees girdled for one year, felled and converted and planks seasoned for 1 year and 9 months.	**85**	..	**73**	**21**	**6***	**1**	Good.
Ditto	Do.	Trees girdled for 18 months, felled and converted and planks seasoned for 15 months.	99	**18·80**	**73**	**26**	**1**	**2***	Do.
Ditto	Do.	Trees girdled for 2 years and 8 months, felled and converted, and planks seasoned for 1 month.	**147**	..	**73**	**26**	..	**2***	Do.
Ditto	Do.	Seasoned in log for one year, ends tarred, converted and seasoned in planks for 1 year 9 months.	12	..	42	58	..	..	Rather poor logs originally.
Ditto	Do.	Seasoned in log for 18 months, ends tarred, converted and seasoned in plank for 15 months.	17	..	54	34	..	12	Poor.
Ditto	Do.	Seasoned in log for 2 years and 5 months, ends tarred, converted and seasoned in plank for 4 months.	15	..	66	34	..	..	Fair.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
Ditto	Do.	Seasoned in log for 1 year, end smeared with Loracine, converted and seasoned in plank for 1 year and 9 months.	..	..	..	..	..	..	Log full of sapwood, experiment cancelled.
Ditto	Do.	Similar experiments as elsewhere with Loracine.	..	..	..	..	..	..	Do.
Ditto	Chittagong Division, Bengal.	Seasoned in log, with bark off, for 24 months, then converted and seasoned in plank for 12 months.	17	17·57	100	..	..	..	Good, though about 33 per cent. slightly split.
Ditto	Do.	Converted green and seasoned in plank for 36 months.	18	19·76	100	..	..	..	Good, but all slightly split.
Ditto	Do.	Seasoned in log, immersed in water for 3 to 6 months, on land for 18 months, then converted and seasoned in plank for 12 months.	66	From 13·12 to 13·73	92	8	..	..	Very good, though discoloured.
Ditto	Do.	Seasoned in log, ends treated with Loracine, bark on, for 12 to 21 months, and seasoned in plank for 14 to 24 months.	13	From 13·97 to 17·51	100	..	..	..	Very good, though some slight cracking.
Ditto	Do.	Seasoned in log, ends treated with cowdung and mud, bark on, for 12 to 22 months, and seasoned in plank for 14 to 24 months.	19	From 13·87 to 16·64	84	16	..	..	Good.
Ditto	Do.	Trees girdled for 12 months, then felled and converted and seasoned in plank for 24 months.	**36**	From 14·14 to **17·37**	**92**	**8**	..	..	Very good all through.
(6) *Bassia latifolia*	Bahraich Division, United Provinces.	Seasoned in log immersed in water for 4 months, then seasoned on land, converted and seasoned in the plank, so as to bring the total period up to 2 years and six months.	21	From 10·94 to 15·93	29	71	..	..	Poor.

* Note.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Percentage. Badly cracked.	Percentage. Badly warped.	Percentage. Insect attack.	Remarks.
(6) ***Bassia latifolia*—contd.**	Bahraich Division, United Provinces.	Seasoned in log, without bark, under shade for 18 months, and as planks for 12 months.	23	From* 10·78 to 14·75	48	52	4	..	Poor, much surface cracking.
Ditto . .	Do. .	Seasoned in log, with bark, under shade, for 18 months, and as planks for 12 months.	25	From 11·64 to 17·50	40	56	4	..	Poor.
Ditto . .	Do. .	Green conversion, planks seasoned in shade and weighted, for 2 years and 6 months.	**47**	From 10·34 to **10·66**	**83**	**15**	**2**	..	Good, though many surface cracks.
(7) *Bassia longifolia* .	N. D. Kanara, Bombay.	Seasoned in log from 15 to 26 months, then converted into planks and seasoned for from 10 to 21 months.	28	16·11	36	64	..	7*	Poor.
Ditto . .	Do. .	Green conversion and planks seasoned for 3 years.	**16**	**18·97**	**69**	**31**	..	..	Good, though period of seasoning is too long.
Ditto . .	Do. .	Logs roughly squared and seasoned for 15 to 26 months, converted into planks and seasoned from 10 to 21 months.	25	..	8	92	..	..	Very poor.
Ditto . .	Do. .	Seasoned in log with ends treated with Loracine, for from 15 to 26 months, converted into planks and seasoned for from 10 to 21 months.	35	..	6	94	..	..	Ditto.
Ditto . .	Do. .	soned in log with ends treated with mud and cow-dung, for from 15 to 26 months, converted into planks and seasoned for from 10 to 21 months.	28	..	57	43	..	..	Fair.
Ditto . .	Do. .	Seasoned in log with ends treated with tar, for from 15 to 26 months, converted into planks and seasoned for from 10 to 21 months.	20	18·13	15	85	..	..	Very poor.
Ditto . .	Do. .	Seasoned in log with cut to centre, for from 15 to 26 months, converted into planks and seasoned for 10 to 21 months.	25	..	35	65	..	..	Poor.
(8) *Bombax malabaricum*	Ramnagar Division, United Provinces.	Planks converted from green logs, immersed in running water for 2 months, stacked in shade and seasoned for 2 years.	10	9·31	50	50	..	..	Fair.
Ditto . .	Siwalik Division, United Provinces.	Planks converted from green logs, immersed in running water for 4 weeks and dried in shed for 19 months.	**14**	**11·08**	**93**	**7**	..	..	Very good.
Ditto . .	Do. .	Logs immersed for 4 months in still water, dried for 13 months in log, converted and dried in plank, in shed for 3 months.	15	15·01	..	53	..	..	Very poor.
Ditto . .	Do. .	As above, but immersed in running water for 4 months.	16	12·30	..	75	..	..	Poor.
Ditto . .	Do. .	Seasoned in log for 17 months, converted and seasoned in plank for 3 months.	25	19·22	..	44	..	..	Riddled by borers, very poor.
Ditto . .	Do. .	Planks converted from green logs and seasoned for 20 months in shed.	15	14·43	..	60	..	..	Very poor.

* Note.—Some or all of those planks which are attacked by insects are also either cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	PERCENTAGE. Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
(9) *Cedrela Toona*	Kurseong Division, Bengal.	Logs seasoned with bark off, in open for 18 months, then converted and planks seasoned for 15 months.	36	27·60	47	53	..	..	Fair.
Ditto	Do.	Girdled for one year, then felled and converted and seasoned in plank for 21 months.	**231**	**22·86**	**91**	**8**	1	..	Very good.
Ditto	Do.	Girdled for 18 months, then felled and converted and seasoned in plank for 15 months.	159	..	82	16	..	2	Do.
Ditto	Do.	Girdled for 31 months, then felled and converted and seasoned in plank for 2 months.	241	..	65	35	..	..	Good.
Ditto	Do.	Seasoned in log immersed in water for 4½ months, on land for 13½ months, then converted and seasoned in plank for 15 months.	67	28·00	40	60	..	2*	Poor, much fungus attack.
Ditto	Do.	Seasoned in log for one year, ends tarred, then converted and seasoned in plank for 21 months.	17	..	59	41	..	6*	Fair.
Ditto	Do.	Seasoned in log for 18 months, ends tarred, then converted and seasoned in plank for 15 months.	30	..	67	33	..	..	Very poor.
Ditto	Do.	Seasoned in log for 2 years and 7 months, ends tarred, then converted and seasoned for 2 months.	34	42·86	85	15	..	..	Good, by still far from seasoned having 42·8 per cent of moisture.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
Ditto	Do.	Seasoned in log for 1 year, ends treated with Loracine, converted and seasoned in plank for 21 months.	22	..	64	36	..	..	Good.
Ditto	Do.	Seasoned in log for 18 months, ends treated with Loracine, converted and seasoned in plank for 15 months.	20	22·90	90	10	..	..	Very good.
Ditto	Do.	Seasoned in log for 30 months, ends treated with Loracine, converted and seasoned in plank for 3 months.	40	..	65	35	..	..	Good.
Ditto	Do.	Converted green, planks seasoned for 2 years and 9 months.	51	..	39	50	20*	..	Poor.
(10) *Dalbergia latifolia*	N. D. Kanara, Bombay.	Logs seasoned with bark on, in the open, for from 15 to 26 months, then converted and seasoned in plank for from 10 to 21 months.	27	13·82	67	33	..	..	Cracks due to original defects in the centre of the timber.
Ditto	Do.	Seasoned in log, with sides roughly squared, for from 15 to 26 months, then converted into planks and seasoned for from 10 to 21 months.	**24**	..	**100**	..	..	..	Very good.
Ditto	Do.	Seasoned in log, with a cut to centre, for from 15 to 21 months, then converted into planks and seasoned for from 10 to 21 months.	19	..	90	10	..	..	Cracks due to original defects in the centre of the timber.
Ditto	Do.	Planks converted from green logs and seasoned in the open for 3 years.	23	14·82	78	22	..	..	Do.
Ditto	Do.	Seasoned in logs, with ends treated with Loracine, for from 15 to 26 months, then converted and seasoned in plank for from 10 to 21 months.	19	..	74	26	..	..	Do.

* NOTE.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	PERCENTAGE. Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
(10) *Dalbergia latifolia*—contd.	N. D. Kanara, Bombay.	Seasoned in log, with ends treated with cowdung and mud, for from 15 to 26 months, then converted and seasoned in plank for from 10 to 21 months.	27	..	93	7	..	..	Cracks due to original defects in the centre of the timber.
Ditto . .	Do. .	Seasoned in log, with ends treated with tar, for from 15 to 26 months, then converted and seasoned in plank for from 10 to 21 months.	**26**	**12·09**	**100**	..	..	..	..
(11) *Dalbergia Sissoo* .	Ramnagar Division, United Provinces.	Logs seasoned in the shade for 18 months, then converted and seasoned in plank for 9 months.	53	From 10·07 to 11·33	89	11	..	..	Good.
Ditto . .	Do. .	Logs immersed in running water for 4 months, seasoned on land and in shade 14 months, then converted and seasoned in plank for 9 months.	56	From 9·17 to 13·85	95	5	..	..	Do.
Ditto	Lahore Division, Punjab.	Seasoned in log, with bark on, for 23 months, then converted and seasoned in plank for 6 months.	12	From 9·87 to 12·15	75	25	..	..	Do.
Ditto .	Do. .	Seasoned in log, with bark off, for 23 months, then converted and seasoned in plank for 6 months.	17	From 8·87 to 10·86	59	41	..	..	Fair.
Ditto .	Do. .	Scantlings cut from green logs, and seasoned for 2 years and 6 months.	27	From 9·60 to 12·00	82	18	..	..	Good.
Ditto . .	Do. .	Trees girdled for 14 months, then felled and converted and seasoned in plank for 15 months.	25	From 8·48 to 9·52	75	20	10*	..	Do.
Ditto . .	Do. .	Trees girdled for 18 months, then felled and converted and seasoned in plank for 12 months.	**22**	**11·47**	**100**	..	..	..	Very good.
Ditto . .	Do. .	Trees girdled for 23 months, then felled and converted and seasoned in plank for 7 months.	14	14·86	89	21	..	..	Good.
Ditto . .	Do. .	Seasoned in log, with ends treated with Loracine, for from 12 to 17 months, and seasoned in plank for from 5 to 10 months.	32	From 9·46 to 12·30	69	31	..	..	Do.
Ditto . .	Do. .	Seasoned in log, with ends treated with cowdung and mud for from 18 to 23 months, then converted and seasoned in plank for 5 to 10 months.	49	From 9·37 to 13·99	59	41	2*	..	Fair.
Ditto . .	Do. .	Seasoned in log, with ends treated with tar, for from 11 to 23 months, then converted and seasoned in plank for from 5 to 17 months.	53	From 9·26 to 14·16	68	32	..	..	Do.
(12) *Dillenia pentagyna*	Kurseong Division, Bengal.	Seasoned in the open, in the log, for 18 months, with bark off, converted and seasoned in the plank for 15 months.	40	..	..	..	..	..	Both planks and rafters all rotten.
Ditto . .	Do. .	Planks converted from green logs and seasoned for 2 years and 9 months.	9	..	..	..	..	..	Ditto.
Ditto . .	Do. .	Seasoned in log, and immersed in water for 4 months, on land for 14 months, converted and seasoned in the plank for 15 months.	27	..	56	44	..	4*	Many planks attacked by fungus.

* NOTE.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	PERCENTAGE. Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
(12) *Dillenia pentagyna*—contd.	Kurseong Division, Bengal.	Trees girdled for 12 months, felled and converted into planks and seasoned for 21 months.	36	38·51	58	42	..	..	Slight fungus attack.
Ditto . .	Do. .	Trees girdled for 21 months, felled and converted into planks and seasoned for 12 months.	**78**	**30·18**	**86**	**14**	..	..	No fungus or insect attack.
Ditto . .	Do. .	Trees girdled for 30 months, felled and converted into planks and seasoned for 3 months.	**38**	..	**97**	..	..	**3**	Material still containing a high percentage of moisture.
Ditto . .	Do. .	Seasoned in log, with ends tarred, for periods varying from 12 to 33 months and then converted.	..	..	..	..	..	..	Both planks and rafters all rotten.
Ditto . .	Do. .	Seasoned in log, with ends treated with Loracine, for periods varying from 12 to 33 months and then converted.	..	..	..	..	..	..	Ditto.
(13) *Diospyros Melanoxylon.*	S. Chanda Division, Central Provinces.	Felled in January, seasoned in log, in shed, with bark on, for 22 months, converted and seasoned in plank for 13 months.	20	..	10	90	..	25*	Very poor.
Ditto . .	Do. .	Felled in January, treated as above, but with bark off.	17	..	59	41	..	6*	Fair.
Ditto . .	Do. .	Felled in April, seasoned in log, in shed, with bark on, for 22 months, converted and seasoned in plank for 10 months.	13	..	15	85	..	38*	Very poor.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
Ditto . .	Do. .	Felled in April, treated as above, but with bark off.	18	..	11	89	..	..	Do.
Ditto . .	Do. .	Felled in August, seasoned in log, in shed, with bark on, for 18 months, converted and seasoned in plank for 10 months.	11	14·90	..	100	..	36*	Do.
Ditto . .	Do. .	Felled in August, treated as above, but with bark off.	10	..	60	40	..	..	Fair.
Ditto . .	Do. .	Log seasoned in water for 3 months; on land, in shed, for 18 months; then converted and seasoned in plank for 14 months.	36	16·42	..	69	8*	75*	Very poor.
Ditto . .	Do. .	Converted from green logs and seasoned, in shed, for 11 months.	15	15·76	60	40	..	7*	Fair.
Ditto . .	Do. .	Converted green, scantlings seasoned in water for 5 months and in shed for 6 months.	7	17·92	72	28	..	..	Good.
Ditto . .	Do. .	Converted green, scantlings seasoned in water for 9 months, and in shed for 2 months.	8	15·44	62	38	..	..	Very fair.
Ditto . .	Do. .	Trees girdled for 23 months, felled and converted and seasoned in shed for 12 months.	**19**	**17·23**	**84**	**16**	..	..	Very good.
(14) *Duabanga sonneratioides.*	Kurseong Division, Bengal.	Logs seasoned with bark off, in open, for 18 months, then converted and seasoned in plank for 15 months.	20	14·74	60	40	5*	..	Fair.
Ditto . .	Do. .	Girdled for 12 months, then felled and converted and seasoned in plank for 21 months.	113	..	58	42	..	..	Do.

* NOTE.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(13) *Duabanga sonneratioides.*	Kurseong Division, Bengal.	Girdled for 24 months, then felled and converted, and seasoned in plank for 9 months.	**194**	**20·68**	**78**	**21**	**2***	..	Good.
Ditto . .	Do. .	Girdled for 33 months, then felled and converted and inspected at once.	138	Still very wet.	59	9	..	22	Fair, much insect attack due to standing girdled too long.
Ditto . .	Do. .	Seasoned in log, immersed in water for 4 months, on land for 14 months, then converted and seasoned in plank for 15 months.	24	44·40	75	21	..	4	Fair, showing signs of rotting.
Ditto . .	Do. .	Seasoned in log for 18 months, ends tarred, then converted and seasoned in plank for 21 months.	17	..	53	35	..	18*	Do.
Ditto . .	Do. .	Seasoned in log for 18 months, ends tarred, then converted and seasoned in plank for 15 months.	30	45·68	80	17	..	3	Planks much attacked by fungus.
Ditto . .	Do. .	Seasoned in log for 26 months, ends tarred, then converted and seasoned in plank for 7 months.	25	..	40	60	..	..	Do.
Ditto . .	Do. .	Seasoned in log for 12 months, ends treated with Loracine, then converted and seasoned in plank for 21 months.	..	..	..	..	..	..	All attacked by fungus and rotten.
Ditto . .	Do. .	Seasoned in log for 18 months, ends treated with Loracine, then converted and seasoned **in planks for 15 months.**	16	..	25	63	..	19*	Commencing to rot.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
Ditto . .	Do. .	Seasoned in log for 26 months, ends treated with Loracine, converted and seasoned in plank for 7 months.	22	..	**67**	**23**	..	..	Fair.
Ditto . .	Do. .	Converted green, and seasoned in plank for 33 months.	21	22·42	38	62	..	..	Fair, no rot.
(15) *Grewia tiliaefolia* .	N. D. Kanara, Bombay.	Natural seasoning in the log, with bark on, for from 15 to 26 months, then converted into planks and seasoned for from 10 to 21 months.	16	16·90	25	69	..	25*	Poor.
Ditto . .	Do. .	Logs rough squared and seasoned for from 15 to 26 months, then converted and seasoned in plank for from 10 to 21 months.	21	..	19	..	..	81	Do.
Ditto . .	Do. .	Seasoned in log with cut to centre, for from 15 to 26 months, then converted and seasoned in plank for from 10 to 21 months.	32	..	44	47	..	16*	Fair.
Ditto . .	Do. .	Converted green and planks seasoned for 36 months.	**20**	**17·85**	**50**	**50**	..	..	Good, but timber left too long exposed.
Ditto . .	Do. .	Seasoned in log with ends treated with Loracine, for from 15 to 26 months, converted and seasoned in plank for from 10 to 21 months.	18	..	28	72	..	8*	Poor.
Ditto . .	Do. .	Seasoned in log, with ends treated with mud and cow-dung, for from 15 to 26 months, converted and seasoned in plank for from 10 to 21 months.	24	..	30	66	..	4	Do.
Ditto . .	Do. .	Seasoned in log, with ends tarred, for from 15 to 26 months, converted and seasoned in plank for from 10 to 21 months.	24	17·79	58	42	..	..	Fair, though slight splitting excessive.

* Note.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(16) *Lagerstrœmia Flos-Reginæ.*	Chittagong Division, Bengal.	Seasoned in log, with bark off, for 24 months, then converted and seasoned in plank for 12 months.	19	18·56	42	58	..	..	Poor to fair.
Ditto . .	Do. .	Converted green and seasoned in plank for 36 months.	**18**	**15·12**	**100**	..	..	..	Very good, though slightly under 50 per cent. are very slightly split.
Ditto . .	Do. .	Seasoned in log, immersed in water for from 3 to 6 months, on land for 18 months, then converted and seasoned in plank for 12 months.	59	16·77	47	53	..	..	Fair to good.
Ditto . .	Do. .	Seasoned in log, ends treated with Loracine, bark on, for 12 to 22 months, and seasoned in plank for 14 to 24 months.	21	From 17·23 to 18·31	57	43	..	..	Good.
Ditto . .	Do. .	Seasoned in log, ends treated with cowdung and mud, bark on, for 12 to 22 months, and seasoned in plank for 14 to 24 months.	22	From 15·68 to 20·28	45	55	..	..	Fair to good.
Ditto . .	Do. .	Trees girdled for 12 months, then felled and converted and seasoned in plank for 24 months.	**29**	From 15·31 to **17·40**	**90**	**10**	..	..	Very good, and even better than green conversion, as 90 per cent. have no signs whatsoever of cracks.
Ditto . .	Do. .	Trees girdled for 24 months, then felled and converted and seasoned in plank for 12 months.	**24**	From 15·70 to **17·28**	**92**	**8**	..	..	Do.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(17) *Lagerstrœmia microcarpa.*	N. D. Kanara, Bombay.	Seasoned in the log, with bark on for 15 to 26 months, converted and seasoned in plank for 10 to 21 months.	29	16·22	41	52	3*	14*	Poor to fair.
Ditto . .	W. D. Kanara, Bombay.	Seasoned in log, in shade, for 21 to 27 months, then converted and seasoned in plank or scantling for 12 to 18 months.	43	..	16	39	7*	77*	Some insect attack and badly cracked. Poor.
Ditto . .	N. D. Kanara, Bombay.	Seasoned in log, with sides rough squared, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	22	..	45	36	4*	18	Poor to fair.
Ditto . .	Do. .	Seasoned in log with cut to centre, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	22	..	..	100	..	18*	Very poor.
Ditto . .	Do. .	Planks converted from green logs and seasoned in the open for 3 years.	17	18·56	48	52	..	..	Fair.
Ditto . .	Do. .	Seasoned in log, with ends treated with Loracine, bark on, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	21	..	14	86	..	..	Very poor.
Ditto . .	Do. .	Seasoned in log, with ends treated with cowdung and mud, bark on, for 15 to 26 months, then converted and seasoned in the plank for 10 to 21 months.	28	..	29	68	..	36*	Poor.
Ditto . .	Do. .	Seasoned in log, with ends tarred, bark on, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	**21**	**16·89**	**71**	**29**	..	7*	Good.
Ditto . .	W. D. Kanara, Bombay.	Buried in mud, in tidal creek, for one year, seasoned in a shed for 9 months, converted and seasoned in plank for 18 months.	26	..	58	11	..	35*	A good lot of timber, cracking slight, the most serious damage is from borers.

* Note.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	PERCENTAGE. Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
(17) *Lagerstrœmia microcarpa*—contd.	W. D. Kanara, Bombay.	As above, but seasoned in log on land for 15 months and in plank for 12 months.	60	..	5	20	6	95*	Heavily attacked by insects, otherwise timber in good condition.
(18) *Lagerstrœmia parviflora.*	Kurseong Division, Bengal.	Seasoned in the open in log, with bark off, for 10 months, converted and seasoned in plank for 15 months.	29	29·50	59	41	..	..	Fair.
Ditto . .	Do. .	Planks converted from green logs, and seasoned for 33 months.	13	27·91	69	31	..	..	Good, though a good deal of fine surface cracking.
Ditto . .	Do. .	Seasoned in log, immersed in water for 5 months, on land for 13 months, then converted and seasoned in plank for 15 months.	23	26·91	74	22	..	4	Do.
Ditto . .	Do. .	Trees girdled for 12 months, then felled and converted and seasoned in plank for 31 months.	**68**	**27·36**	**90**	**7**	..	6*	Very good, surface cracking **not** serious.
Ditto . .	Do. .	Trees girdled for 18 months, then felled and converted and seasoned in plank for 15 months.	58	..	71	22	..	10*	Good.
Ditto . .	Do. .	Trees girdled for 30 months, then felled and converted and seasoned in plank for 3 months.	69	..	48	13	..	48*	Heavily attacked by large borers.
Ditto . .	Do. .	Seasoned in log for 12 months, ends tarred, then converted and seasoned in plank for 21 months.	12	..	8	66	..	33*	Very poor.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
Ditto .	Do. .	Seasoned in log for 18 months, ends tarred, then converted and seasoned in plank for 15 months.	19	29·11	53	47	..	..	Poor to fair.
Ditto . .	Do. .	Seasoned in log for 30 months, ends tarred, then converted and seasoned in plank for 3 months.	15	..	53	33	..	33*	Do.
Ditto . .	Do. .	Seasoned in log for 12 months, ends treated with Loracine, then converted and seasoned in plank for 21 months.	16	38·50	69	31	..	..	Very fair.
Ditto . .	Do. .	Seasoned in log for 18 months, ends treated with Loracine, then converted and seasoned in plank for 15 months.	15	..	80	20	..	..	Good.
Ditto . .	Do. .	Seasoned in log for 30 months, ends treated with Loracine, then converted and seasoned in plank for 3 months.	16	..	75	25	..	..	Do.
Ditto . .	S. Chanda, Central Provinces.	Felled in January, seasoned in log, in shed, with bark on, for 21 months, then converted and seasoned in plank for 14 months.	9	..	..	100	10*	..	Very poor.
Ditto . .	Do. .	Felled in January, treated as above, but with bark off.	10	..	20	80	..	..	Do.
Ditto . .	Do. .	Felled in April, seasoned in log, in shed, with bark on, for 18 months, then converted and seasoned in plank for 14 months.	11	..	9	91	..	..	Do.
Ditto . .	Do. .	Felled in April, treated as above, but with bark off.	..	..	..	..	..	..	Logs heavily split and therefore not converted.
Ditto . .	Do. .	Felled in August, seasoned in log, in shed, with bark on, for 15 months, then converted and seasoned in plank for 9 months and 14 months.	9	..	56	44	..	..	Fair.

* NOTE.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Percentage. Badly cracked.	Percentage. Badly warped.	Percentage. Insect attack.	Remarks.
(18) *Lagerstræmia parviflora*—contd.	S. Chanda, Central Provinces.	Felled in August and treated as above, but with bark off.	5	..	40	60	..	..	Poor to fair.
Ditto . .	Do. .	Trees girdled for 22 months, then felled and converted and seasoned in plank for 12 months.	8	21·10	62	38	..	..	Good deal cracking, due to original defect.
Ditto . .	Do. .	Log seasoned in water for 3 months, in shed, on land for 17 months, then converted and seasoned in plank for 14 months.	13	17·55	15	77	..	8	Very poor.
Ditto . .	Do. .	Converted green and seasoned in water for 5 to 9 months and seasoned in shed for 2 to 6 months.	**9**	**16·90**	**89**	**11**	..	..	Good.
Ditto . .	Do. .	Converted green and seasoned in shed for 11 months.	10	27·48	80	20	..	..	Do.
(19) *Machilus odoratissima.*	Darjeeling Division, Bengal.	Seasoned in open, in log for 18 months, then converted and seasoned in plank for 18 months.	47	30·88	96	2	..	2	Good, though slight warp is recorded in many instances.
Ditto . .	Do. .	Logs converted green and planks seasoned for 33 months.	23	43·62	..	..	..	..	Timber chiefly rotten and very much discoloured.
Ditto . .	Do. .	Seasoned in log, immersed in water for 5 months, on land for 12 months, then converted and seasoned in plank for 18 months.	34	53·44	56	3	..	44*	At the time of inspection, the insect attack was not severe but was developing.
Ditto . .	Do. .	Trees girdled for 12 months, then felled and converted and seasoned in plank for 24 months.	**194**	..	**93**	**7**	..	..	Very good.
Ditto . .	Do. .	Trees girdled for 18 months, then felled and seasoned in plank for 18 months.	**130**	**27·29**	**92**	**8**	..	..	Very good, colour even better than that of 12 months girdled timber.
Ditto . .	Do. .	Seasoned in log for 12 months, ends treated with Loracine, then converted and seasoned in plank for 18 months.	16	41·94	31	19	..	56*	Poor.
Ditto . .	Do. .	Seasoned in log for 18 months, ends treated with Loracine, then converted and seasoned in plank for 12 months.	21	..	75	5	..	20	Fair.
Ditto . .	Do. .	Seasoned in log for 24 months, ends treated with Loracine, then converted and seasoned in plank for 6 months.	21	..	50	5	..	15	50 per cent of timber much attacked by fungus and rotten.
(20) *Michelia Champaca*	Kurseong Division, Bengal.	Seasoned in open, in log, bark off, for 18 months, then converted and seasoned in plank for 15 months.	50	28·20	50	26	..	24	Poor, a good deal of fungus attack.
Ditto . .	Do. .	Logs converted green and planks seasoned for 33 months.	21	23·42	28	62	..	14*	Poor.
Ditto . .	Do. .	Seasoned in log, immersed in water for 4 months, on land for 14 months, then converted and seasoned in plank for 15 months.	35	24·56	57	43	..	..	Fair.
Ditto . .	Do. .	Trees girdled for 12 months, then felled and converted and seasoned in plank for 21 months.	**84**	..	**73**	**25**	..	**2**	Good.
Ditto . .	Do. .	Trees girdled for 21 months, then felled and converted and seasoned in plank for 12 months.	**144**	**31·10**	**72**	**28**	..	..	Do.

* Note.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
(20) *Michelia Champaca*—*contd.*	Kurseong Division, Bengal.	Trees girdled for 30 months, then felled and converted and seasoned in plank for three months.	**71**	..	**84**	**16**	..	..	Very good, but still very green.
Ditto . .	Do. .	Seasoned in log for 12 months, ends tarred, then converted and seasoned in plank for 21 months.	16	..	38	62	..	..	Poor, also fungus attack.
Ditto . .	Do. .	Seasoned in log for 18 months, ends tarred, then converted, and seasoned in plank for 15 months.	25	26·26	64	28	..	8	Fair, a good deal of fungus attack.
Ditto . .	Do. .	Seasoned in log for 30 months, ends tarred, then converted and seasoned in plank for 3 months.	34	..	44	21	..	35	Poor, some fungus attack.
Ditto . .	Do. .	Seasoned in log for 12 months, ends treated with Loracine, then converted and seasoned in plank for 21 months.	12	..	25	17	..	..	75 per cent. attacked by fungus.
Ditto . .	Do. .	Seasoned in log for 18 months, ends treated with Loracine, then converted and seasoned in plank for 15 months.	13	20·18	50	31	..	..	50 per cent. of the timber attacked by fungus.
Ditto . .	Do. .	Seasoned in log for 30 months, ends treated with Loracine, then converted and seasoned in plank for 3 months.	10	..	50	10	..	..	Do.
(21) *Morus indica* .	Lahore Division, Punjab.	Logs seasoned in shade, with bark on, for 12 to 24 months, then converted and seasoned in plank for 6 to 18 months.	18	From 10·55 to 11·06	55	28*	44*	..	Poor, much warped, a good deal of surface cracking.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
Ditto . .	Do. .	Logs seasoned in shade, with bark off, for 18 months, then converted and seasoned in plank for 12 months.	22	From 10·81 to 14·17	32	23*	64*	..	Poor, much warped.
Ditto . .	Do. .	Scantlings cut from green logs, and seasoned in shade for 30 months.	19	From 8·24 to 11·96	32	21	53*	..	Do.
Ditto . .	Do. .	Trees girdled for 8 months, then converted and seasoned in scantling for 22 months.	**12**	**16·99**	**83**	**17**	..	..	Good, though slight warp noticed in a few scantlings.
Ditto . .	Do. .	Trees girdled for 12 months, then converted and seasoned in scantlings for 18 months.	**8**	**11·59**	**93**	**7**	..	..	Good, though slight warp and surface cracking noticeable.
Ditto . .	Do. .	Trees girdled for 18 months, then converted and seasoned in scantlings for 12 months.	12	From 12·11 to 16·02	75	..	25	..	Do.
Ditto . .	Do. .	Seasoned in log, with ends treated with Loracine, for 9 to 17 months, then converted and seasoned in scantling for 13 to 21 months.	20	From 10·75 to 19·94	80	5*	20*	..	Good, very little serious warping.
Ditto . .	Do. .	Seasoned in log, with ends treated with cowdung and mud, for 13 to 24 months, then converted and seasoned in scantling for 6 to 17 months.	34	From 7·70 to 16·18	41	23*	50*	..	Poor, much warped.
Ditto .	Do. .	Seasoned in log, with ends treated with tar, for 12 to 23 months, then converted and seasoned in scantling for 7 to 18 months.	26	From 8·83 to 14·68	39	8	61	..	Do.
(22) *Ougeinia dalbergioides.*	N. D. Kanara, Bombay.	Logs seasoned with bark on, in open, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	19	15·29	84	..	..	16	Good.

*NOTE.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Percentage. Badly cracked.	Percentage. Badly warped.	Percentage. Insect attack.	Remarks.
(22) *Ougeinia dalbergioides*—contd.	N. D. Kanara, Bombay.	Seasoned in log, with sides rough squared, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	**19**	..	**95**	**5**	..	..	Very good.
Ditto	Do.	Seasoned in log, with a cut to centre, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	27	..	74	4	..	22	Good.
Ditto	Do.	Planks converted from green logs, and seasoned in open for 36 months.	**20**	**17·62**	**95**	**5**	..	..	Very good.
Ditto	Do.	Seasoned in log, with ends treated with Loracine, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	23	..	80	8	12	..	Good.
Ditto	Do.	Seasoned in log, with ends treated with cowdung and mud, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	29	..	70	27	..	3	Good; one log originally very faulty.
Ditto	Do.	Seasoned in log, with ends tarred, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	23	17·13	87	..	..	13	Good.
Ditto	S. Chanda Division, Central Provinces.	Felled in January, seasoned in log, in shed, with bark on, for 22 months, then converted and seasoned in plank for 13 months.	15	..	60	..	..	40	Fair, a good deal of surface cracking.
Ditto	Do.	Felled in January, treated as above, but with bark off.	**11**	..	**91**	**9**	..	..	Very good, though a number of planks slightly warped.
Ditto	Do.	Felled in April, seasoned in log, in shed, with bark on, for 19 months, then converted and seasoned in plank for 13 months.	7	..	..	14	..	100*	Very poor.
Ditto	Do.	Felled in April, treated as above, but with bark off.	7	..	58	14	28	..	Fair.
Ditto	Do.	Felled in August, seasoned in log, in shed, with bark on for 15 months, then converted and seasoned in plank for 13 months.	6	..	51	16	..	33	Fair.
Ditto	Do.	Felled in August, treated as above, but with bark off.	**9**	**16·44**	**100**	..	..	..	Very good, though several planks are very slightly split.
Ditto	Do.	Logs immersed in water for 3 months, seasoned on land for 17 months, then converted and seasoned in plank for 15 months.	23	17·74	87	13	..	..	Good.
Ditto	Do.	Trees girdled for 21 months, then felled and converted and seasoned in plank for 13 months.	10	18·38	40	..	..	60	Fair.
(23) *Pinus longifolia*	Rawalpindi Division, Punjab.	Seasoned in the log, with bark off, for 12 months, then converted and seasoned in plank or rafter for 10 months.	6	13·17	34	16	66	..	Poor.
Ditto	Do.	Seasoned in log, with bark off, for 18 months, then converted and seasoned in plank or rafter for 12 months.	8	From 13·29 to 14·09	100	..	..	..	Fair to good, all slightly cracked.
Ditto	Do.	Seasoned in log, with bark off, for 24 months, then converted and seasoned in plank or rafter for 6 months.	12	From 11·85 to 14·03	34	17	16	33	Fair to good, and some slightly warped.

*NOTE.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(23) *Pinus longifolia* —contd.	Rawalpindi Division, Punjab.	Planks and rafters converted from green timber, and seasoned for 30 months.	**46**	From 12·85 to **13·07**	**77**	**19**	**4**	..	Good, though a good deal of surface cracking and slight warping.
Ditto .	Do. .	Timber seasoned in log for 12 to 24 months, with ends treated with Loracine, then converted into B. G. sleepers fitted with "S" clamps fixed to ends, and seasoned for 6 to 18 months.	4	15·51	75	..	25	..	Good, slightly warped.
Ditto .	Do. .	Timber seasoned in log for 12 to 24 months, with ends treated with cowdung and mud, then converted into B.G. sleepers, fitted with "S" clamps on ends, and seasoned for 6 to 18 months.	4	18·91	75	..	25	..	Good.
Ditto .	Do. .	Timbers seasoned in log for 12 to 24 months, with ends tarred, then converted into B. G. sleepers, fitted with "S" clamps, and seasoned for 6 to 18 months.	4	17·90	75	..	25	..	Do.
Ditto .	Kangra Division, Punjab.	Seasoned in log, with bark off, for 12 months, then converted and seasoned in scantlings or sleepers for 18 months.	17	9·33	6	35	..	94*	Poor, due to insect attack.
Ditto .	Do. .	Seasoned in log, with bark off, for 18 months, then converted and seasoned in scantlings or sleepers for 12 months.	17	10·45	..	..	..	100	Do.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
Ditto .	Do. .	Seasoned in log, with bark off for 24 months, then converted and seasoned in scantlings or sleepers for 6 months.	12	12·05	..	..	..	100	Do.
Ditto .	Do. .	B. G. sleepers and rafters converted from green logs and seasoned for 30 months.	**140**	From 9·24 to **11·95**	**89**	**5**	**6**	..	Very good.
Ditto .	Do. .	Timber seasoned in log for 12 to 24 months, ends treated with Loracine, then converted into planks, rafters and B. G. sleepers, and seasoned for 6 to 18 months.	53	From 9·96 to 15·23	13	..	..	87	Poor.
Ditto .	Do. .	Timber seasoned in log for 12 to 24 months, ends treated with mud and cowdung, then converted into planks, scantlings and B. G. sleepers and seasoned for 6 to 18 months.	51	From 9·26 to 10·65	2	..	..	98	Do.
Ditto .	Do. .	Timber seasoned in log for 12 to 24 months, ends tarred, then converted into planks, scantlings and B. G. sleepers and seasoned for 6 to 18 months.	50	From 8·80 to 10·39	28	..	..	72	Do.
(24) *Pterocarpus Marsupium.*	Sambalpur Division, Bihar and Orissa.	Timber seasoned in log, bark on, for 12 to 24 months, then converted and seasoned in plank for 4 to 16 months.	27	24·23	100	..	..	..	A good deal of discolouration and some slight splitting.
Ditto .	Do. .	Timber seasoned in log, with bark off, for 12 to 24 months, then converted and seasoned in plank for 4 to 16 months.	26	29·25	73	27	..	..	Badly discoloured.
Ditto .	Do. .	Logs immersed in water for 4 months, seasoned on land for 14 months, then converted and seasoned in plank for 10 months.	54	13·32	82	18	..	..	A good deal discoloured.

* NOTE.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(24) *Pterocarpus Marsupium*—contd.	Sambalpur Division, Bihar and Orissa.	Converted green into planks, allowed to season in the shade for 28 months.	47	13·73	91	9	..	..	Badly discoloured.
Ditto	Do.	Converted green into planks and immersed in water for 2 to 4 months, then allowed to season on land for 24 to 26 months.	57	13·88	98	2	..	..	Very good, and very little discolouration, especially those planks which were soaked for 4 months.
Ditto	N. D. Kanara, Bombay.	Seasoned in log, with bark on, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	17	15·52	59	23	6*	23*	Badly discoloured.
Ditto	Do.	Logs rough squared and seasoned for 15 to 26 months, then converted and seasoned in planks for 10 to 21 months.	22	..	68	32	..	..	Do.
Ditto	Do.	Seasoned in log, with cut to centre, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	22	..	64	9	..	27	Do.
Ditto	Do.	Converted green, and planks seasoned for 36 months.	25	14·08	88	4	..	8	Do.
Ditto	Do.	Seasoned in log, with ends treated with Loracine, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	21	..	67	33	..	5*	Do.
Ditto	Do.	Sesaoned in log, with ends treated with cowdung and mud, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	23	..	48	22	4*	26	Do.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
Ditto	Do.	Seasoned in log, with ends tarred, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	25	16·73	56	20	..	28*	Do.
Ditto	S. Chanda, Central Provinces.	Felled in January, seasoned in log, in shed, with bark on, for 22 months, then converted and seasoned in the plank for 13 months.	16	..	50	50	6*	12*	Fair, 66 per cent. of the planks slightly split.
Ditto	Do.	Felled in January, treated as above, but with bark off.	16	..	69	31	6*	..	Fair, 65 per cent. of the planks slightly cracked and several slightly warped.
Ditto	Do.	Felled in April, seasoned in log, in shed, with bark on, for 19 months, then converted and seasoned in plank for 13 months.	14	..	36	57	..	14*	Poor.
Ditto	Do.	Felled in April, treated as above, but with bark off.	12	..	8	84	..	24*	Do.
Ditto	Do.	Felled in August, seasoned in log, in shed, with bark on, for 15 months, then converted and seasoned in plank for 13 months.	13	..	23	38	..	61*	Do.
Ditto	Do.	Felled in August, treated as above, but with bark off.	13	15·81	15	46	..	39	Do.
Ditto	Do.	Logs immersed in water for 3 months, on land for 17 months, then converted and seasoned in plank for 14 months.	35	21·44	74	26	..	..	Fair to good, 70 per cent. of the planks were slightly cracked.
Ditto	Do.	Trees girdled and left standing for 22 months, then felled and converted and seasoned in plank for 13 months.	22	15·84	85	10	..	5	Fair to good, 50 per cent. of the planks were slightly cracked.
(25) *Schima Wallichii*	Kurseong Division, Bengal.	Logs seasoned with bark off, in open for 18 months, then converted and seasoned in plank for 15 months.	38	24·21	66	34	..	..	Poor, a good deal of fungus attacked.

* Note.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	PERCENTAGE. Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
(25) *Schima Wallichii* —contd.	Kurseong Division, Bengal.	Logs converted green and planks seasoned for 33 months.	46	22·24	78	22	..	..	Good.
Ditto .	Do. .	Logs immersed in water for 6 months, seasoned in log on land for 12 months, then converted and seasoned in plank for 15 months.	45	22·13	29	7	9*	..	Poor.
Ditto .	Do. .	Trees girdled for 12 months, then felled and converted and seasoned in plank for 21 months.	45	20·20	69	29	..	2	Good.
Ditto .	Do. .	Trees girdled for 18 months, then felled and converted and seasoned in plank for 15 months.	84	..	93	8	1*	..	Very good.
Ditto .	Do. .	Trees girdled for 30 months, then felled and converted and seasoned in plank for 3 months.	47	..	85	15	..	..	Good.
Ditto .	Do. .	Seasoned in log, with ends tarred, for 12 to 30 months, then converted and seasoned for 3 to 21 months.	50	19·81	82	2	..	4	12 per cent. rotten and attacked by fungus all slightly cracked. Fair only.
Ditto .	Do. .	Seasoned in log, with ends treated, with Loracine, for 12 to 30 months, then converted and seasoned in plank for 3 to 21 months.	40	24·19	22	60	..	5	Poor, 13 per cent. rotten and attacked by fungus.
(26) *Shorea robusta* .	Haldwani Division, United Provinces.	Seasoned in log, in shade, for 20 months, then converted and seasoned in plank for 12 months.	36	From 14·49 to 16·38	89	8	3	..	Very good.
Ditto	Do. .	Logs converted green, and planks seasoned in shade for 32 months.	30	From 13·95 to 14·83	87	13	..	..	Good.
Ditto .	Do. .	Logs immersed in water for 3 months, seasoned in log on land for 6 months, then converted and seasoned in plank for 23 months.	39	From 12·75 to 15·30	72	15	3	..	Do.
Ditto .	Singhbhum Division, Bihar and Orissa.	Seasoned in log, bark off, in shade for 16 to 20 months, then converted and seasoned in plank for 20 to 29 months.	22	From 11·18 to 14·11	..	27	..	100*	Poor, heavily attacked by borers.
Ditto .	Do. .	As above, but with bark on .	..	From 11·90 to 12·78	5	30	..	95*	Poor.
Ditto .	Do. .	Logs converted green and seasoned in shade for 45 months.	..	..	76	20	4*	4	Good, though 25 per cent. of the planks are slightly warped.
Ditto .	Do. .	Logs immersed in water for 4 months, seasoned in log on land for 14 months, then converted and seasoned under cover, in plank or rafter for 26 months.	45	From 11·91 to 12·30	73	27	..	..	Good.
Ditto .	Do. .	Converted green and planks immersed in water for 2 months, then seasoned on land, in shade for 43 months.	45	From 11·31 to 12·20	80	20	..	..	Good, though up to 25 per cent. slightly split.
Ditto .	Do. .	Seasoned in log, with ends treated with tar and cowdung, for 16 to 24 months, then converted and seasoned in plank or rafter for 21 to 29 months.	15	From 11·16 to 14·25	..	40	..	100*	Poor.
Ditto .	Do. .	As above, but ends treated with Loracine.	25	From 14·28 to 15·56	64	36	..	4*	Fair, still partly green.

* NOTE.—Some or all of these planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	PERCENTAGE. Sound.	PERCENTAGE. cracked.	PERCENTAGE. Badly warped.	PERCENTAGE. Insect attack.	REMARKS.
(27) *Stephegyne parvifolia.*	S. Chanda Division, Central Provinces.	Felled in January, seasoned in log, with bark off, in shed for 23 months, then converted and seasoned in plank for 12 months.	17	..	29	71	..	12*	Poor.
Ditto	Do.	Treated as above, but with bark on.	17	..	41	53	..	18*	Do.
Ditto	Do.	Felled in April, seasoned in log, with bark off, in shed, for 23 months, then converted and seasoned in plank, for 12 months.	11	..	18	64	..	36	Do.
Ditto	Do.	Treated as above, but with bark on.	12	..	17	75	..	33*	Do.
Ditto	Do.	Felled in August, seasoned in log, with bark off, in shed, for 23 months, then converted and seasoned in plank for 12 months.	10	16·68	10	40	..	80*	Do.
Ditto	Do.	Treated as above, but with bark on.	10	..	30	30	..	60*	Do.
Ditto	Do.	Logs immersed in water for 3 months, seasoned in log on land for 17 months, then converted and seasoned in plank for 15 months.	27	17·23	26	63	..	23*	Do.
Ditto	Do.	Trees girdled for 22 months, then felled and converted and planks seasoned for 13 months.	**17**	**18·45**	**64**	**24**	..	**12**	Fair to good.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	cracked.	Badly warped.	Insect attack.	REMARKS.
28 *Tectona grandis*	Do.	Felled in January, seasoned in log, in shed, with bark on, for 21 months, then converted and seasoned in plank for 14 months.	19	..	84	16	..	..	Fair, 68 per cent. of the planks were slightly cracked.
Ditto	Do.	Treated as above, but with bark off.	11	..	27	73	..	..	Poor.
Ditto	Do.	Felled in April, seasoned in log, in shed, with bark on, for 18 months, then converted and seasoned in plank for 14 months.	15	..	33	67	..	..	Do.
Ditto	Do.	Treated as above, but with bark off.	20	..	35	65	..	..	Do.
Ditto	Do.	Felled in August, seasoned in log in shed, with bark on, for 15 months, then converted and seasoned in plank for 14 months.	14	15·87	57	43	..	..	Fair.
Ditto	Do.	Treated as above, but with bark off.	15	..	67	33	..	..	Good.
Ditto	Do.	Trees girdled for 22 months, then felled and converted and seasoned in plank for 12 months.	**19**	**30·25**	**84**	**16**	..	..	Do.
Ditto	Do.	Log immersed in water for 3 months, seasoned on land for 17 months, then converted and seasoned in plank for 15 months.	26	30·25	23	77	..	..	Poor.
(29) *Terminalia Arjuna*	Do	Felled in January, seasoned in log, with bark off, in shed, for 23 months, then converted and seasoned in plank for 13 months.	**13**	..	**85**	**15**	..	..	Good.
Ditto	Do.	Treated as above, but with bark on.	13	..	77	23	..	8*	Do.

* NOTE.—Some or all of these planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
(29) *Terminalia Arjuna*—contd.	S. Chanda Division, Central Provinces.	Felled in April, seasoned in log, with bark off, in shed, for 23 months, then converted and seasoned in plank for 13 months.	11	..	9	82	..	27*	Very poor.
Ditto .	Do. .	Treated as above, but with bark on.	15	..	27	53	9*	47*	Poor.
Ditto .	Do. .	Felled in August and seasoned in log, with bark off, in shed, for 23 months, then converted and seasoned in plank for 13 months.	15	14·11	60	40	..	..	Fair.
Ditto .	Do. .	Treated as above, but with bark on.	11	..	50	50	9*	..	Do.
Ditto .	Do. .	Log immersed in water for 3 months, then seasoned on land, in shed, for 18 months, then converted and seasoned in plank for 14 months.	27	16·43	44	52	4	..	Poor to fair.
Ditto .	Do. .	Trees girdled for 23 months, then converted and seasoned in plank 12 months.	**20**	**17·24**	**85**	**15**	..	..	Good.
Ditto .	Jhansi Division, United Provinces.	Logs left *in situ* as they were felled in the forest in open, for 18 months, then converted and seasoned in plank for 6 months.	10	From 7·56 to 8·75	..	40	20*	80*	Very poor, several planks also rotten.
Ditto .	Do. .	Logs seasoned in shade for 18 months, then converted and seasoned in plank for 6 months.	32	From 7·43 to 11·71	66	30	9*	Sap much attacked	Fair, though nearly all the sapwood is destroyed by borers.

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Sound.	Badly cracked.	Badly warped.	Insect attack.	Remarks.
Ditto .	Do. .	Logs immersed in water for 4 months, seasoned on land for 14 months, then converted and seasoned in balks for 6 months.	**26**	From 7·03 to 10·40	31	65*	39*	..	Poor, though sapwood not attacked by insects.
Ditto .	Do. .	Converted green, and seasoned in shed, in plank for 24 months.	**42**	**From 8·35 to 9·94**	**76**	**17**	**7**	Sap much attacked	Good, only sapwood damaged.
(30) *Terminalia belerica*	Kurseong Division, Bengal.	Seasoned in open, in log, with bark off for 18 months, converted and seasoned in plank for 15 months.	**21**	..	..	..	..	..	Both planks and rafters all rotten.
Ditto .	Do. .	Planks converted from green logs seasoned for 33 months, in the open.	17	..	..	..	..	..	Do.
Ditto .	Do. .	Seasoned in log, immersed in water for 5 months, on land for 15 months, then converted and seasoned in plank for 13 months.	27	..	..	..	..	..	Do.
Ditto .	Do. .	Trees girdled for 12 months, then felled and converted and seasoned in plank for 21 months.	33	..	73	3	..	27*	Good.
Ditto .	Do. .	Trees girdled for 21 months, then felled and converted and seasoned in plank for 12 months.	**31**	**36·90**	**90**	**10**	..	..	Do.
Ditto .	Do. .	Trees girdled for 30 months, then felled and converted and seasoned in plank and rafter for 3 months.	51	..	..	..	..	..	The planks all rotten, rafters fair, cannot stand girdled through two monsoons.
Ditto .	Do. .	Seasoned in log, with ends tarred, for 12 months, then converted and seasoned in plank for 21 months.	12	..	36	58	..	8	Poor.

* Note.—Some or all of those planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage: Sound.	Percentage: Badly cracked.	Percentage: Badly warped.	Percentage: Insect attack.	REMARKS.
(30) *Terminalia belerica* —contd.	Kurseong Division, Bengal.	Seasoned in log, with ends tarred, for 18 to 24 months, then converted and seasoned in plank for 9 to 15 months.	40	..	15	38	..	20*	Poor, 34 per cent. attacked by fungus and rotten.
Ditto .	Do. .	Seasoned in log, with ends treated with Loracine, for 18 to 24 months, then converted and seasoned in plank for 9 to 15 months.	33	..	9	9	..	58*	Poor, 33 per cent. rotten.
(31) *Terminalia paniculata.*	N. D. Kanara, Bombay.	Logs seasoned with bark on, in open, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	29	14·97	38	62	..	..	Poor.
Ditto .	Do. .	Seasoned in log, with sides rough squared, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	28	..	47	46	..	7	Fair.
Ditto .	Do. .	Seasoned in log, with end cut to centre, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	24	..	54	46	..	..	Fair to good.
Ditto .	Do. .	Planks converted from green logs, and seasoned in open for 36 months.	**32**	**14·17**	**81**	**19**	..	..	Good.
Ditto .	Do. .	Seasoned in log, with ends treated with Loracine, for 15 to 26 months; then converted and seasoned in plank for 10 to 21 months.	26	..	38	62	..	..	Poor.
Ditto .	Do. .	Seasoned in log, with ends treated with cowdung and mud, for 15 to 26 months; then converted and seasoned in plank for 10 to 21 months.	24	..	38	62	..	..	Do.
Ditto .	Do. .	Seasoned in log, with ends tarred, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	23	17·85	61	39	..	..	Fair.
Ditto .	W. D. Kanara, Bombay.	Seasoned in log, in shade, for 21 months, then converted in October and seasoned in plank and scantling for 18 months.	23	..	43	22	..	48*	A certain amount of discolouration and fine cracking. Fair.
Ditto .	Do. .	Seasoned in log, in shade, for 27 months, then converted in April and seasoned in plank and scantling for 12 months.	8	..	62	38	..	..	Fair to good.
Ditto .	Do. .	Logs immersed in tidal creek for 12 months, then seasoned in log on land, for 9 months, converted in October and seasoned in plank and scantling for 18 months.	28	..	65	32	3	..	Fair to good.
Ditto .	Do. .	As above, but in log on land for 15 months, converted in April and seasoned in plank and scantling for 12 months.	36	..	73	27	..	..	Good.
(32) *Terminalia tomentosa.*	S. Chanda Division, Central Provinces.	Felled in January, seasoned in log, with bark off, for 21 months; then converted and seasoned in plank for 14 months.	15	..	40	60	..	..	Fair.
Ditto .	Do. .	Treated as above, but with bark on.	19	..	6	89	..	42	Poor.
Ditto .	Do. .	Felled in April, seasoned in log, with bark on, for 18 months; then converted and seasoned in plank for 14 months.	28	..	11	89	..	4*	Do.

* NOTE.—Some or all of these planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage. Sound.	Badly cracked.	Badly warped.	Insect attack.	REMARKS.
(32) *Terminalia tomentosa*—contd.	S. Chanda Division, Central Provinces.	Treated as above, but with bark on.	15	..	..	93	..	66*	Very poor.
Ditto .	Do. .	Felled in August, seasoned in log, with bark off, for 15 months; then converted and seasoned in plank for 14 months.	13	..	23	77	..	23*	Poor.
Ditto .	Do. .	Treated as above, but with bark on.	12	23·51	..	100	8*	66*	Very poor.
Ditto .	Do. .	Trees girdled for 24 months, then felled and converted and seasoned in plank for 10 months.	28	From 14·66 to 17·95	76	17	..	7	Good.
Ditto .	Do. .	Trees girdled for 36 months, then felled and converted and seasoned in plank for 10 months.	7	..	14	70	..	86*	Left standing girdled too long, hence insect attack.
Ditto .	Do. .	Log immersed in water for 3 months, seasoned on land for 18 months; then converted and seasoned in plank for 14 months.	47	17·15	38	32	..	13*	Poor, much slight as well as bad splitting.
Ditto .	Do. .	Converted green, and seasoned in shed, for 11 months.	**12**	**17·47**	**92**	8	..	..	Very good.
Ditto .	Do. .	Converted green, planks immersed for 5 months in water and seasoned in shed for 6 months.	**6**	**26·93**	**100**	..	..	..	Still green, requires another six months to season.
Ditto .	Do. .	Converted green, planks immersed for 9 months in water and seasoned in shed for 2 months.	**7**	..	**100**	..	..	..	Do.
Ditto .	Kheri Division, United Provinces.	Logs seasoned in shade for 18 months, then converted and seasoned in plank or rafter for 20 months.	41	From 15·60 to 19·67	56	44	..	..	Fair, a good number slightly warped and slightly split.
Ditto .	Do. .	Logs immersed in water for 4 months, seasoned on land for 14 months; then converted and seasoned in plank or rafter for 20 months.	42	From 11·12 to 18·43	76	19	..	5	Fair to good, nearly all slightly split and many slightly warped.
Ditto .	Do. .	Timber converted from green logs and seasoned in shade for 38 months.	**39**	From 13·15 to 13·73	**85**	**10***	**10***	**15**	Good, very slightly split.
(33) *Xylia xylocarpa*	N. D. Kanara, Bombay.	Seasoned in log, with bark on in open, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	25	17·08	8	88	8*	4	Poor.
Ditto .	Do. .	Logs rough squared and seasoned for 15 to 26 months then converted and seasoned in plank for 10 to 21 months.	24	..	..	100	..	..	Very poor.
Ditto .	Do. .	Seasoned in log, with cut to centre, for 15 to 26 months then converted and seasoned in plank for 10 to 21 months.	20	..	..	100	..	..	Do.
Ditto .	Do. .	Converted green and planks seasoned for 36 months.	30	18·63	43	57	..	..	Fair to good.
Ditto .	Do. .	Seasoned in log, with ends, treated with Loracine, for 15 to 26 months; then converted and seasoned in plank for 10 to 21 months.	26	..	15	85	..	..	Poor.
Ditto .	Do. .	Seasoned in log, with ends, treated with cowdung and mud, for 15 to 26 months; then converted and seasoned in plank for 10 to 21 months.	32	..	16	84	..	..	Do.

* NOTE.—Some or all of these planks which are attacked by insects are also either badly cracked or badly warped or both.

APPENDIX IV—*contd.*

Species.	Locality.	Method of seasoning.	Pieces examined.	Moisture percentage at time of inspection.	Percentage.				Remarks.
					Sound.	Badly cracked.	Badly warped.	Insect attack.	
(33) *Xylia xylocarpa*—contd.	N. D. Kanara, Bombay.	Seasoned in log with ends tarred, for 15 to 26 months, then converted and seasoned in plank for 10 to 21 months.	27	16·77	11	89	..	..	Poor.
Ditto .	W. D. Kanara, Bombay.	Seasoned in log, in shade, for 21 months, then converted in October and seasoned in plank and scantling for 18 months.	13	..	7	54	7*	47*	Do.
Ditto .	Do. .	Seasoned in log, in shade, for 27 months, converted in April, and seasoned in plank and scantling for 12 months.	6	..	17	83	33*	50*	Very poor.
Ditto .	Do. .	Logs seasoned in tidal creek for 12 months, then seasoned in log on land for 9 months, converted in October and seasoned in plank and scantling for 18 months.	20	..	65	30	..	5	Good.
Ditto .	Do. .	Logs immersed in tidal creek for 12 months, then seasoned in log on land for 18 months, converted in April, and seasoned in plank and scantling for 12 months.	15	..	20	47	33*	27*	Poor.

* NOTE.—Some or all of these planks which are attacked by insects are also either badly cracked or badly warped or both.

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